Pad Chamber Dead Areas in Simulation

Acknowledgement of other ISUJetters:
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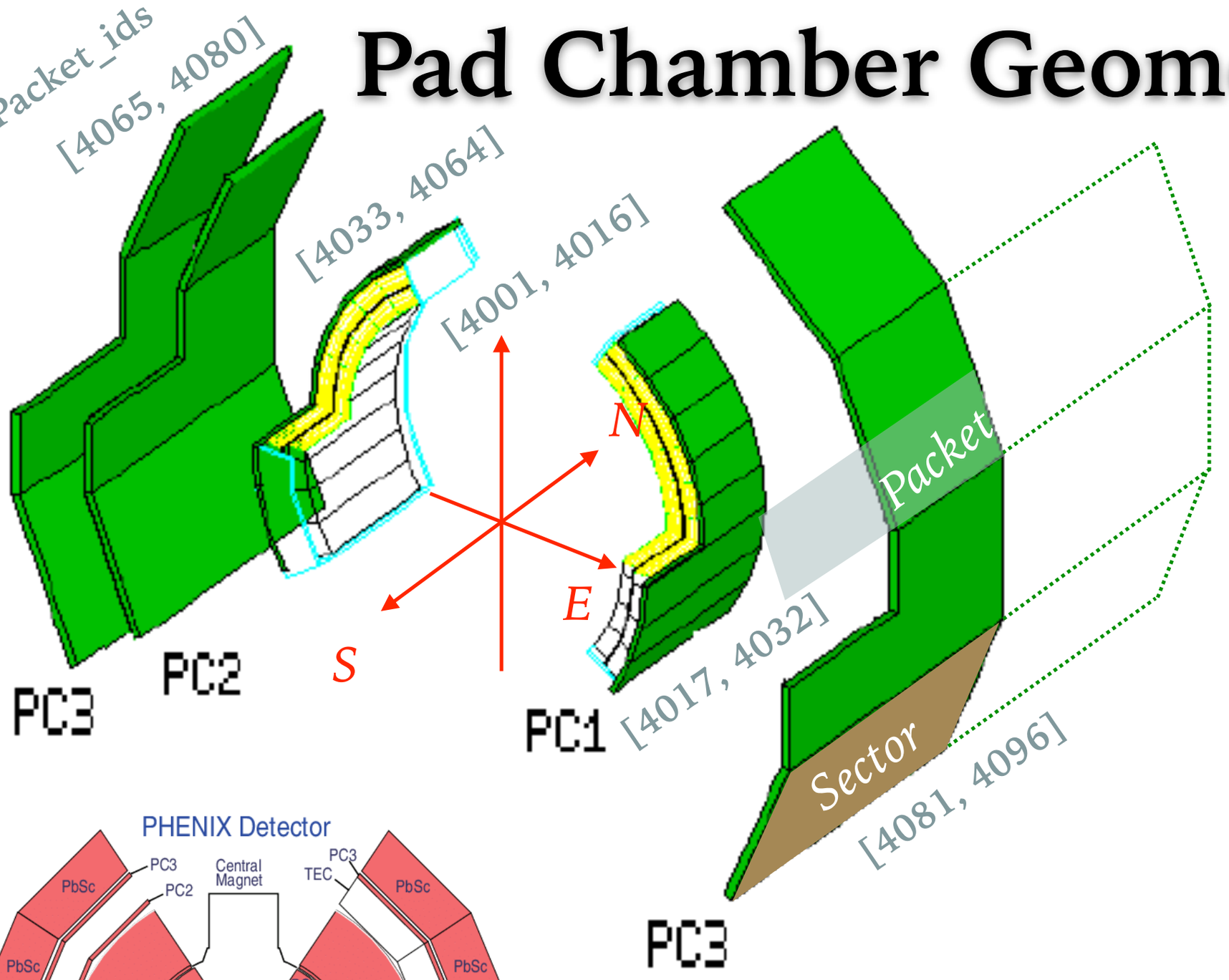
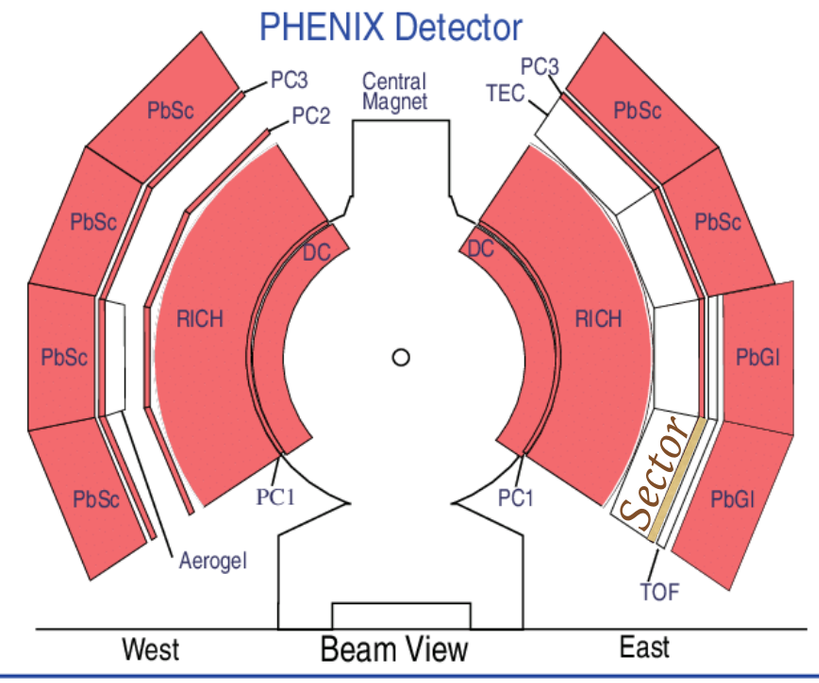
Pad Chamber Geometry



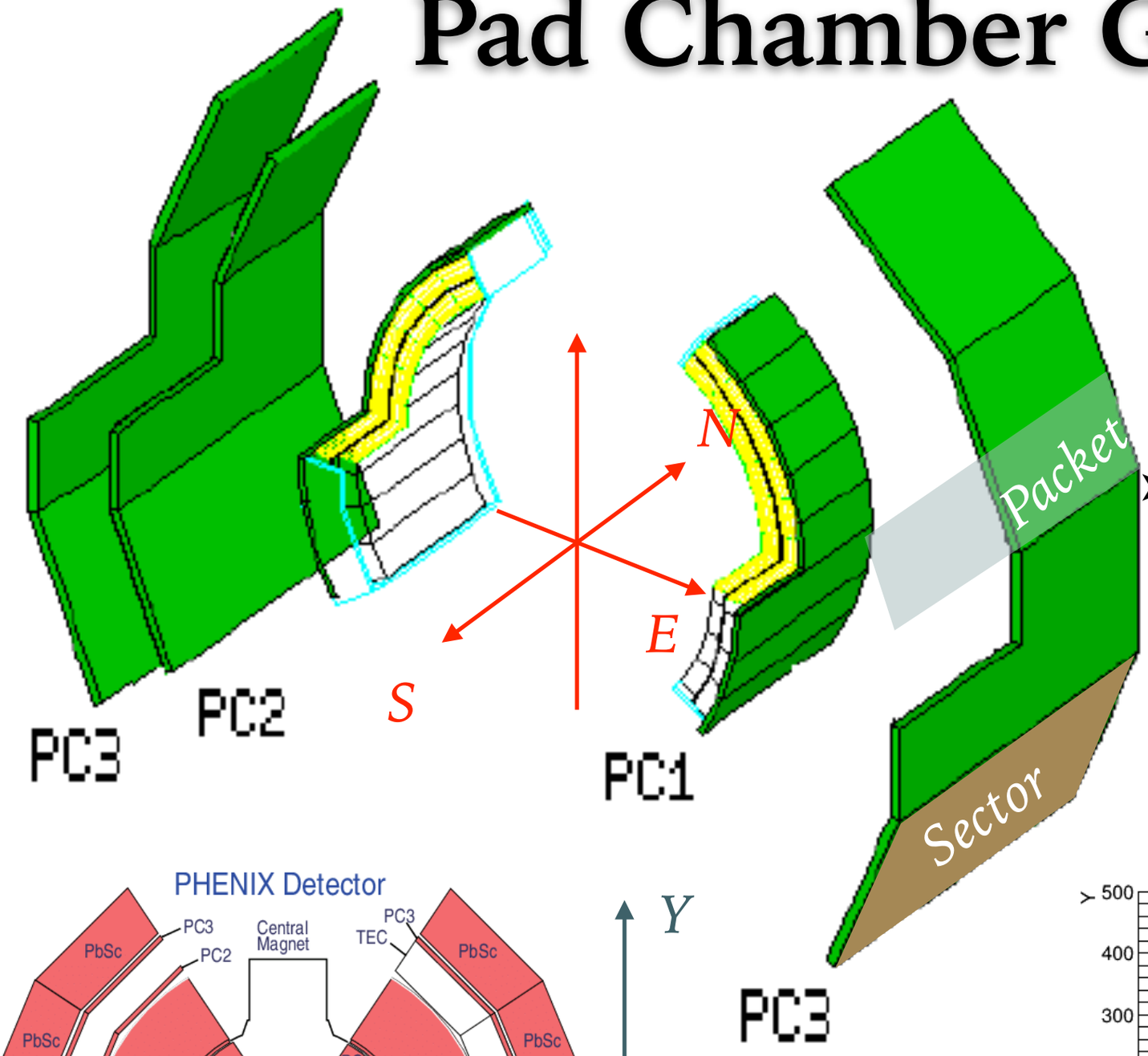


- Each chamber plane:
  - 8 sectors
  - 2 packets / sector

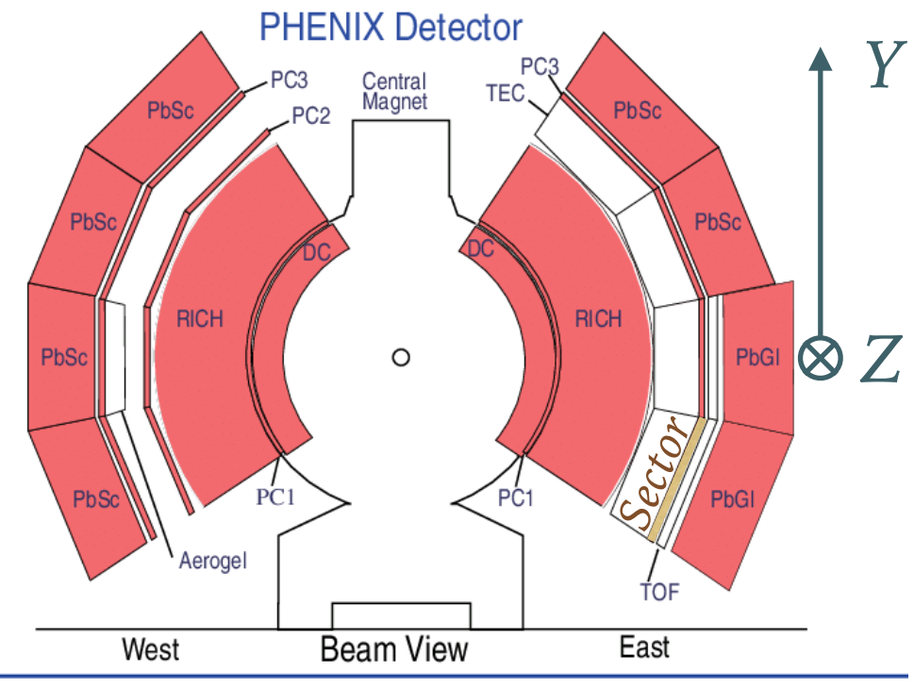
References on last page.

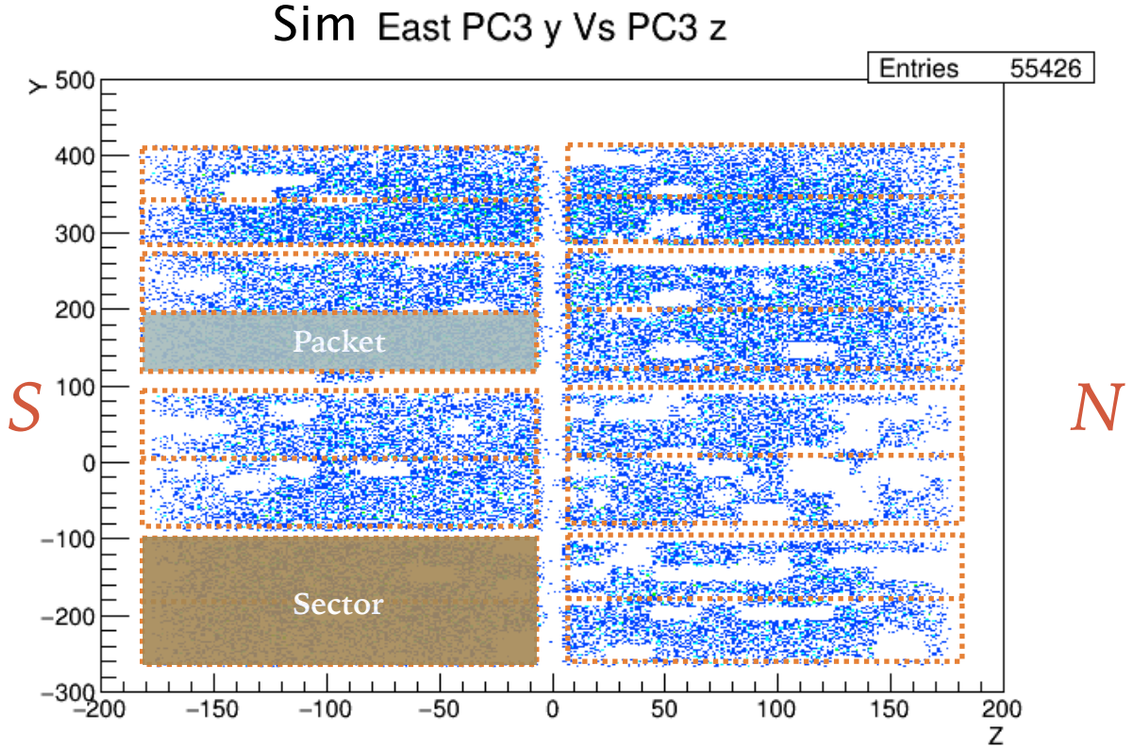
All underlined texts are linked throughout slides

Pad Chamber Geometry



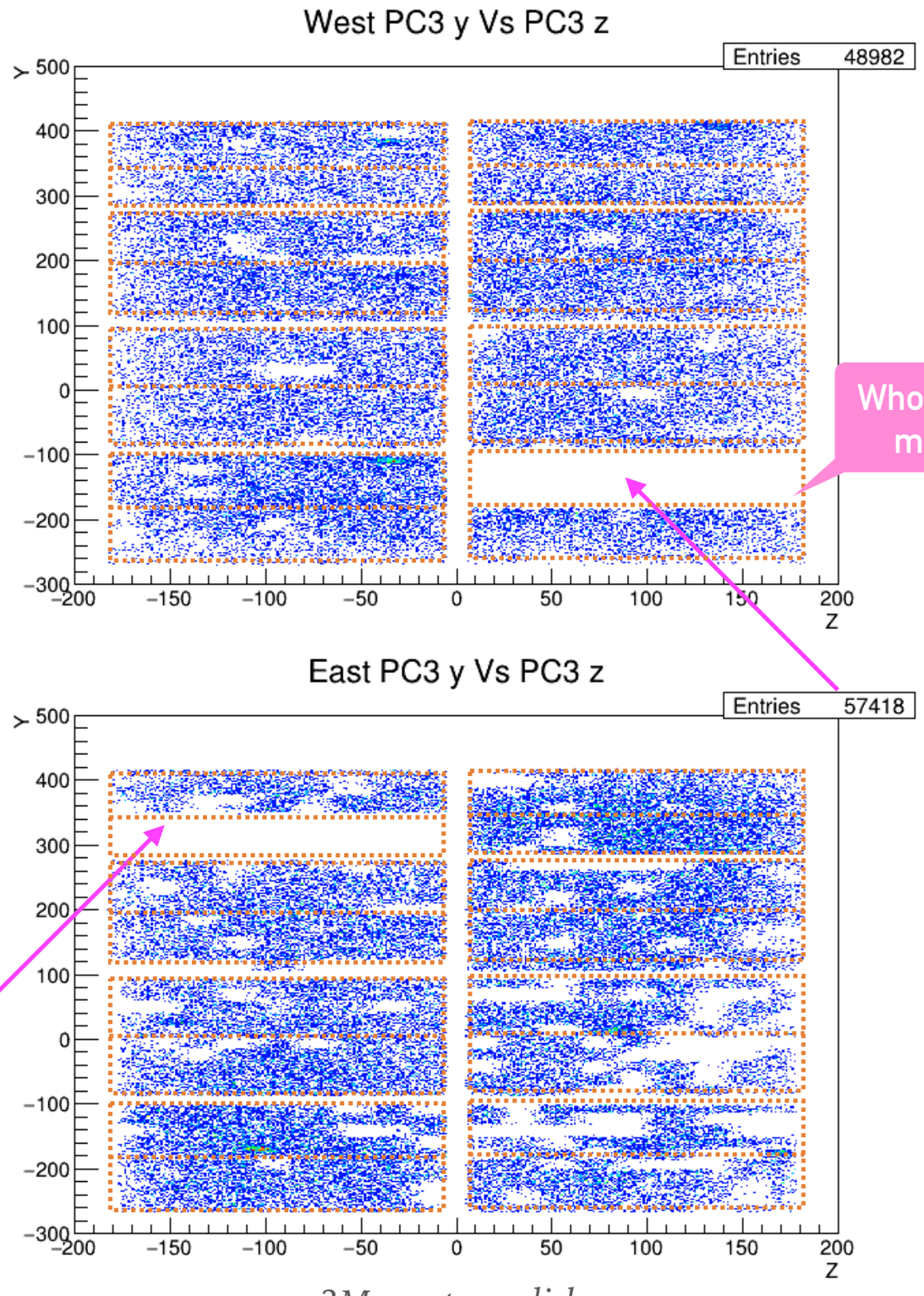
- Each chamber plane:
  - 8 sectors
  - 2 packets / sector
- Plot Y vs Z (QA for sim)
  - Y=PHCentralTrack.get_ppc3y();
  - Z=PHCentralTrack.get_ppc3z();



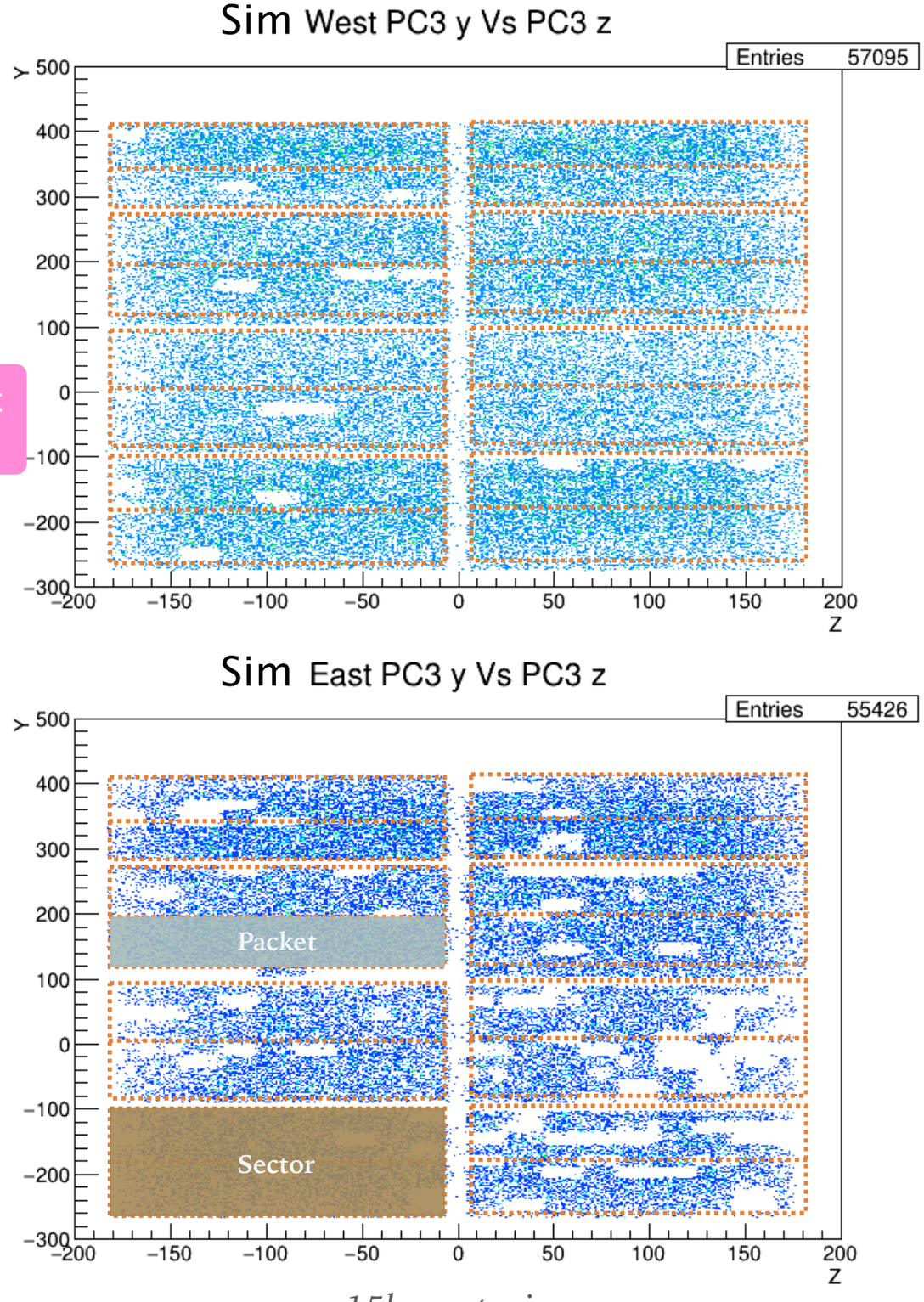


Run13pp510 PC3 Dead Areas

- Default yields in missing areas…



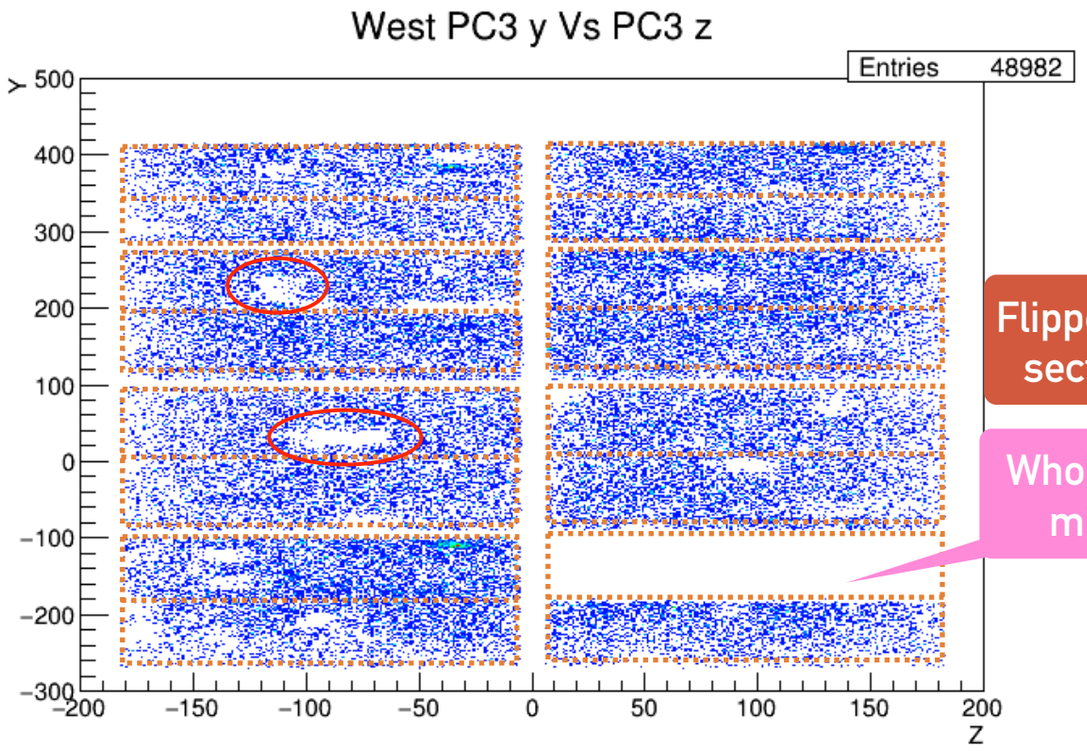
3M events on-disk

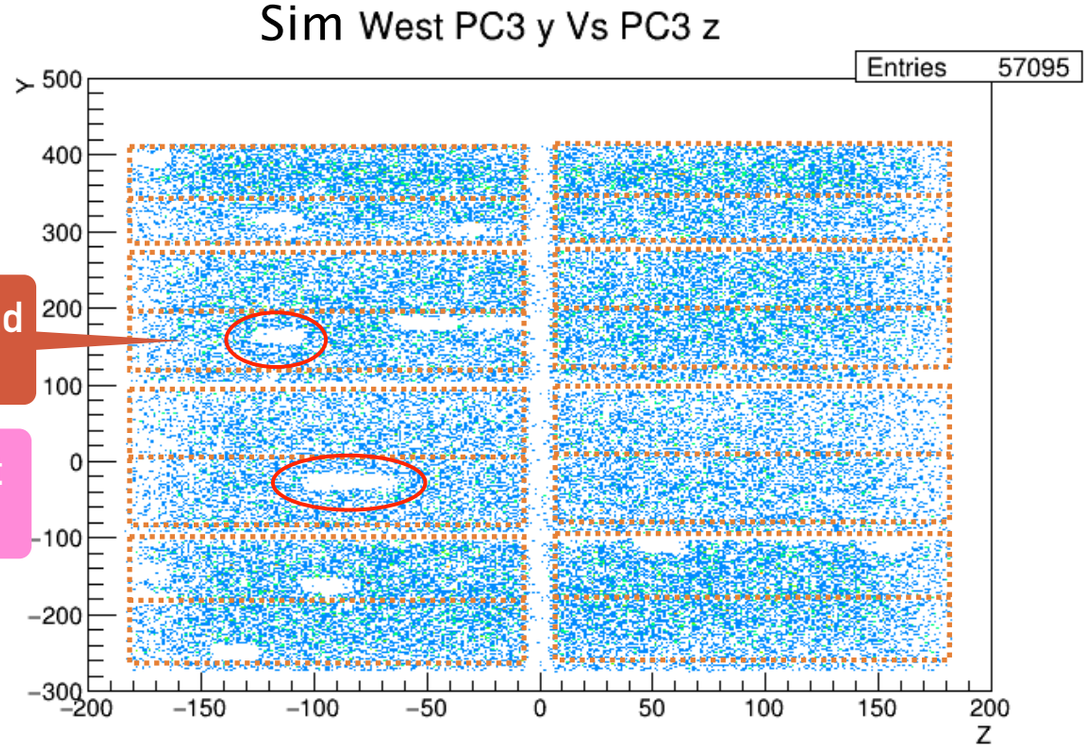


15k events sim

Run13pp510 PC3 Dead Areas

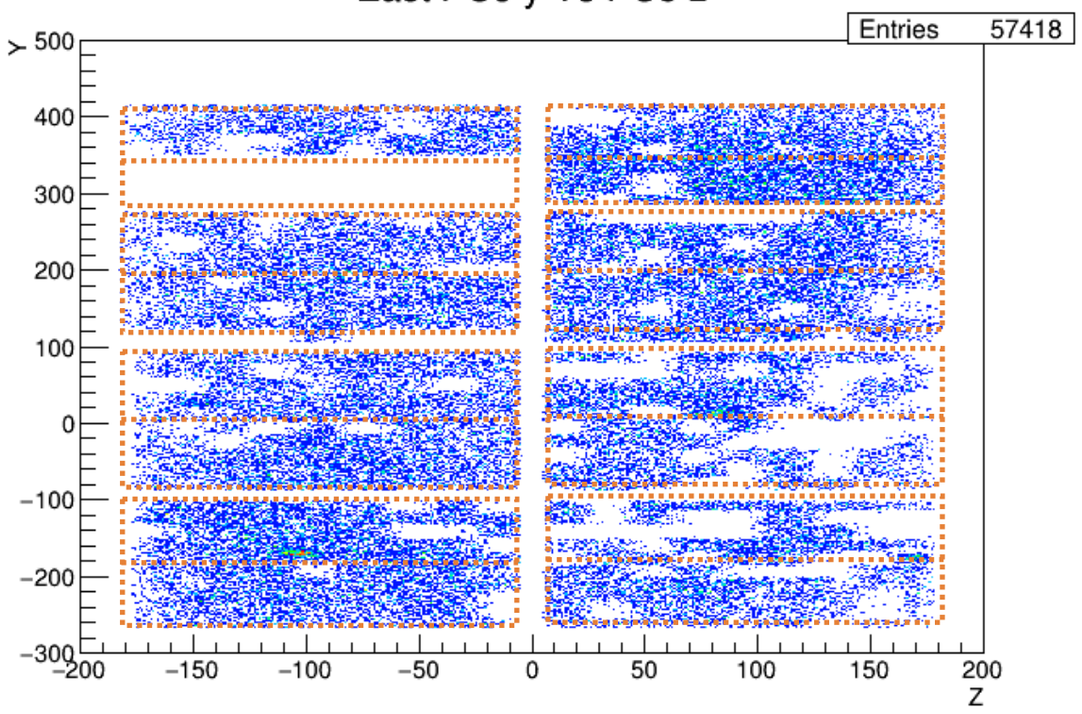
- Default yields in missing areas and PC3W inconsistent locations.



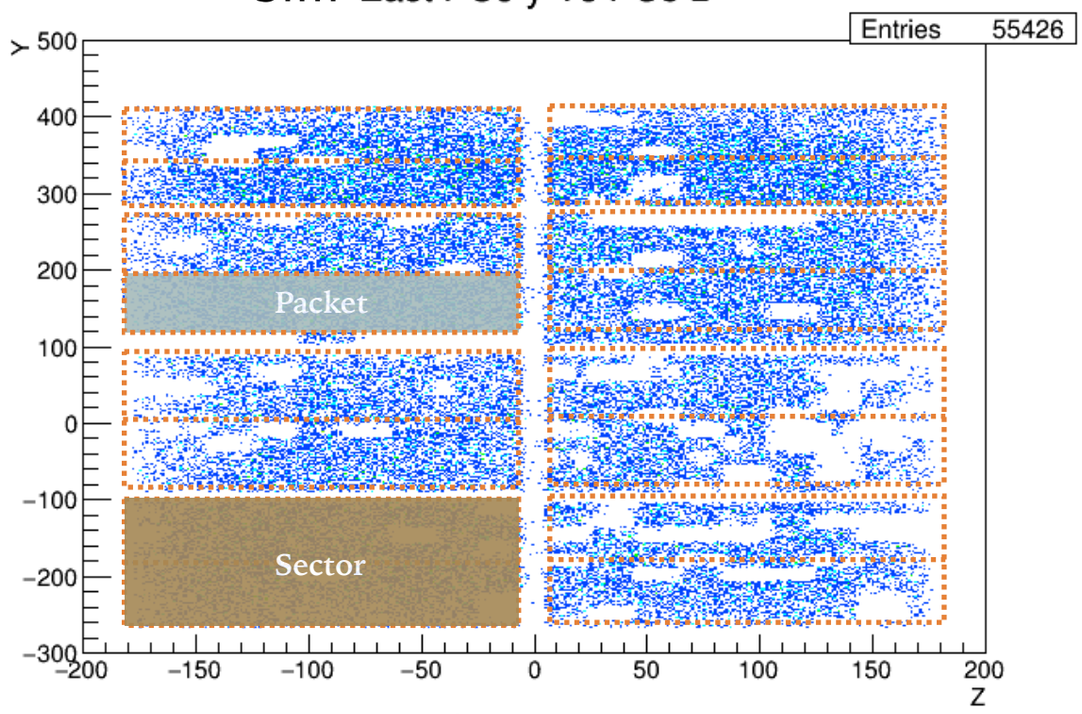


Flipped around sector axes!

Whole packet missing!



3M events on-disk



15k events sim

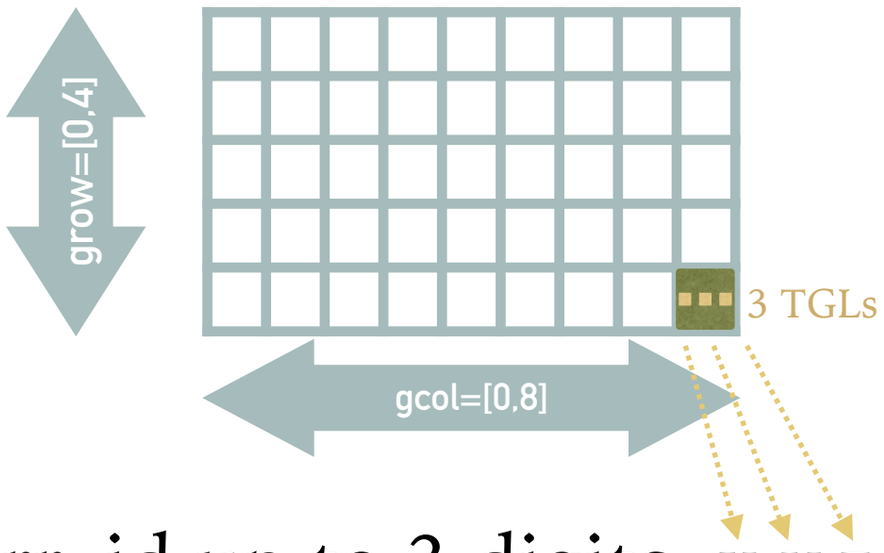
PC Dead Areas in Simulation

- Implemented during pisaToDST stage
- Default list fetched from database according to runnumber
  - Can be viewed by running: getBadRoc.C *//Linked, credit: /draft/chiu/*
  - Format:

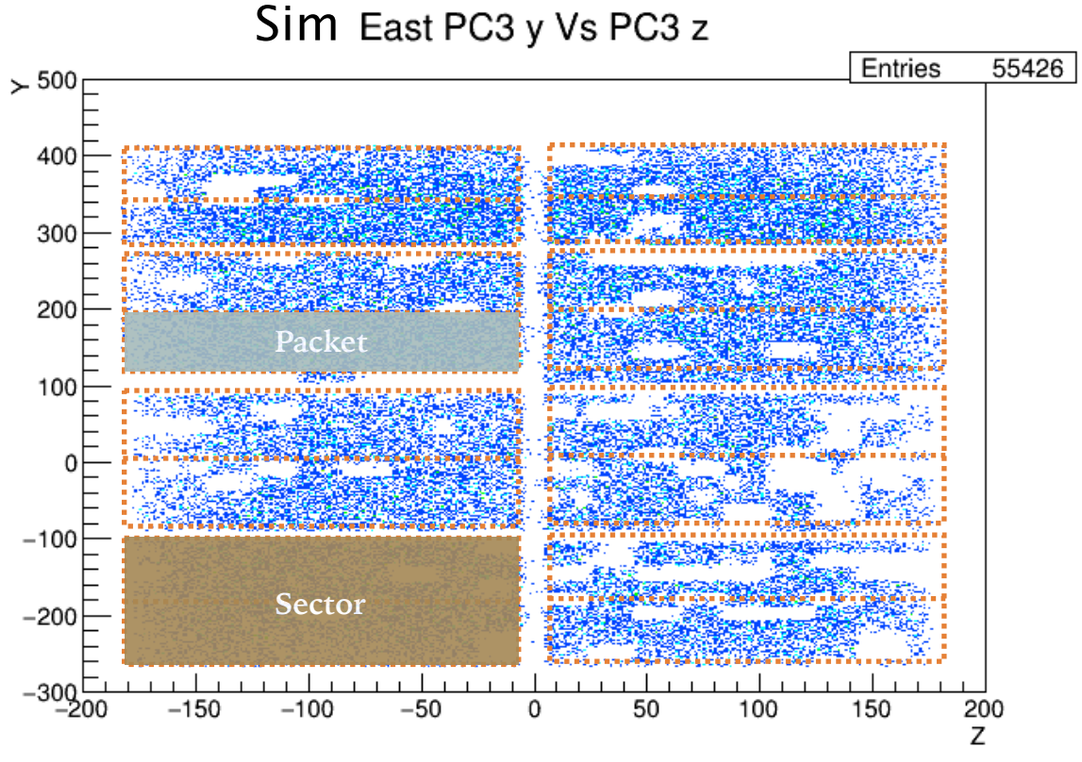
```
343
4001    2    5    110
4012    0    5      2
...
```

```
Total number of bad ROCs
packet_id        grow     gcol     err_id
[4001,4096]      [0,4]    [0,8]    -1,0,1,2
...          Location                Flag
```

- ROCs = PC readout chips

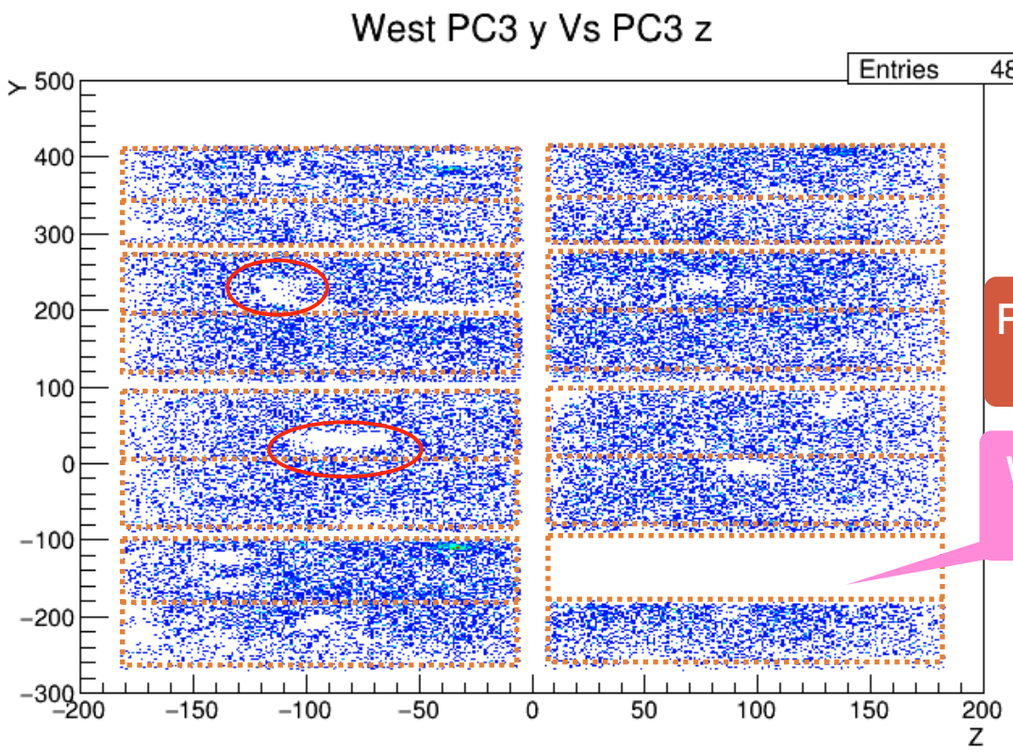


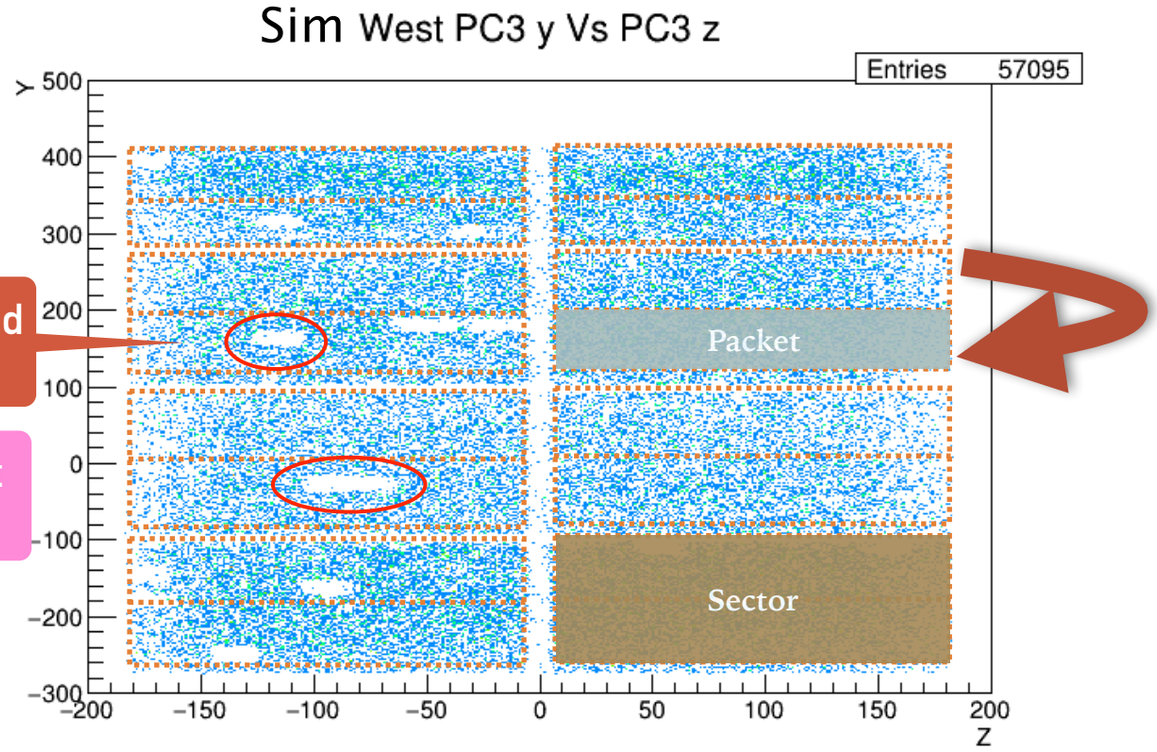
- Err_id up to 3 digits: x,y,z



Run13pp510 PC3 Dead Areas

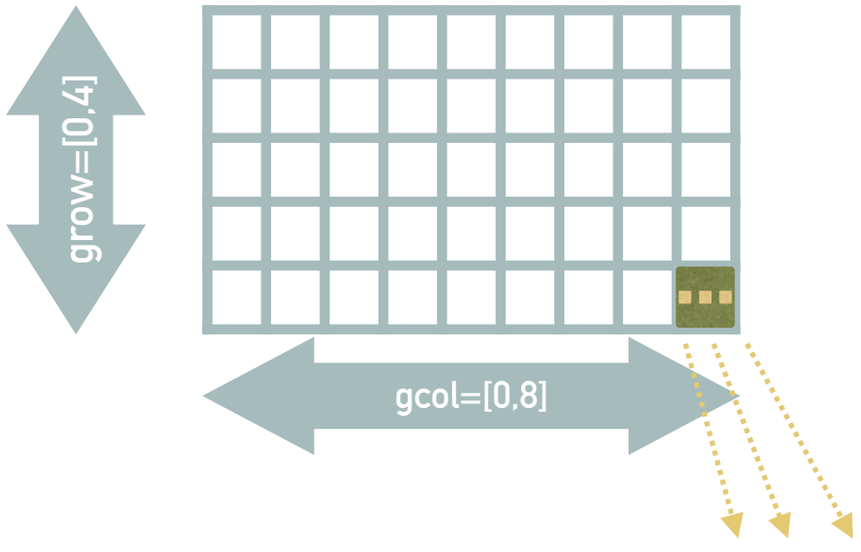
- To include missing areas and to flip PC3W inconsistent locations.





Flipped around sector axes!

Whole packet missing!



- For packet_id ∈ [4065,4080]
  - Let grow = 4 - grow
  - Exchange neighboring packet_ids
- Always set err_id = 222

Run13sim PC Dead Areas

Total number of bad ROCs

packet_id	grow	gcol	err_id
[4001,4096]	[0,4]	[0,8]	-1,0,1,2
Location			*Flag*

- Obtained pad_deadroc.dat by getBadRoc.C from database
- "Fix"ed the file accordingly (wrote flipROC.C)

```
343
4001   2   5   110
4012   0   5     2
...
4065   0   2    10
4066   1   3   210
4066   2   2   120
4067   3   7    22
4068   4   5   111
...
4096   1   4     1
```

```
343
4001   2   5   222
4012   0   5   222
...
4066   4   2   222
4065   3   3   222
4065   2   2   222
4068   1   7   222
4067   0   5   222
...
4096   1   4   222
```

- Always set err_id = 222
- For packet_id ∈ [4065,4080]
  - Let grow = 4 - grow
  - Exchange neighboring packet_ids

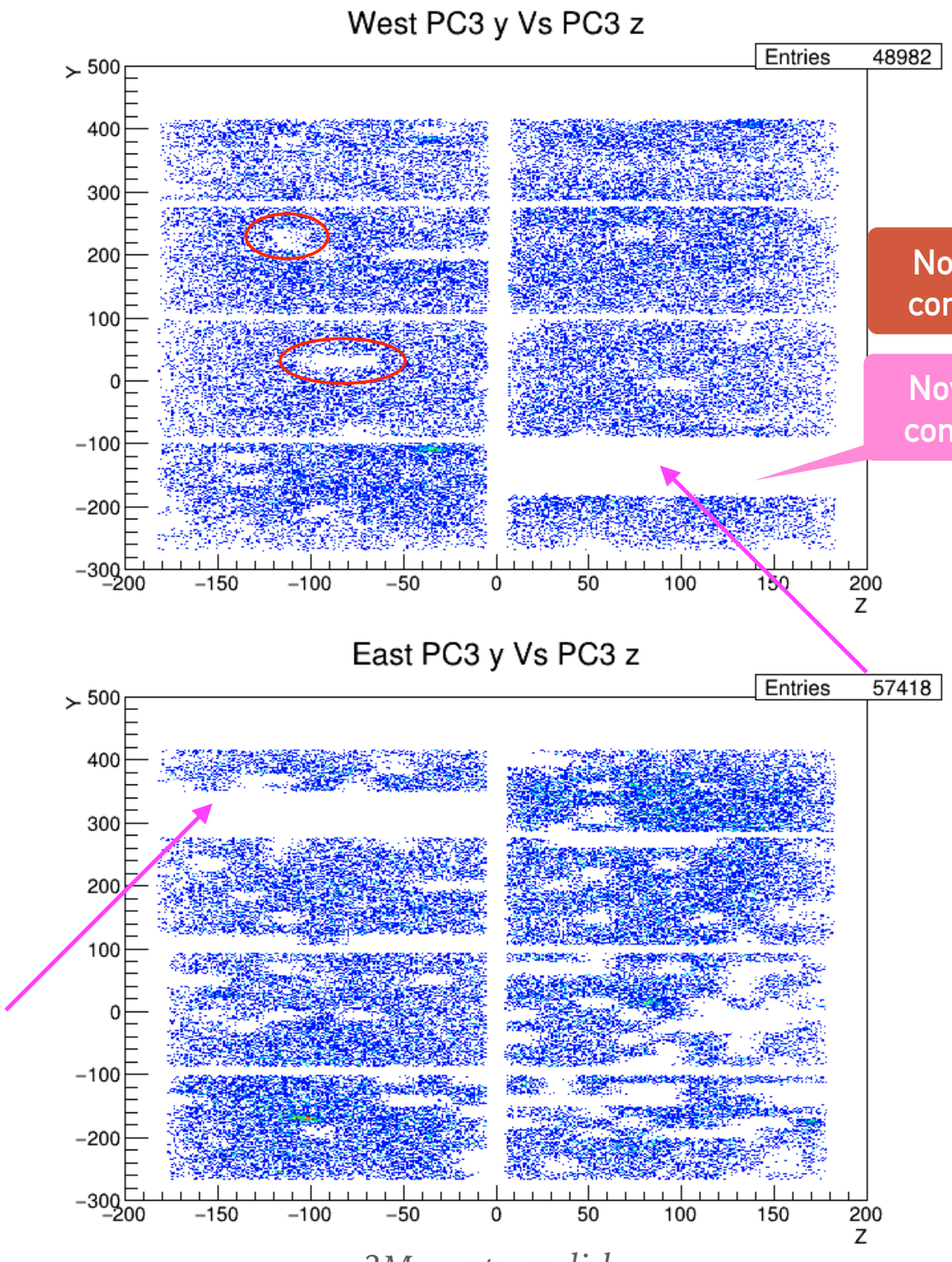
- Included local file in pisaToDST to replace default

```
recoConsts *rc = recoConsts::instance();
rc ->set_CharFlag("PADDEADROCFILE","pad_deadroc.dat");
```

- Result: better consistency between data vs sim

Run13pp510 PC3 Dead Areas

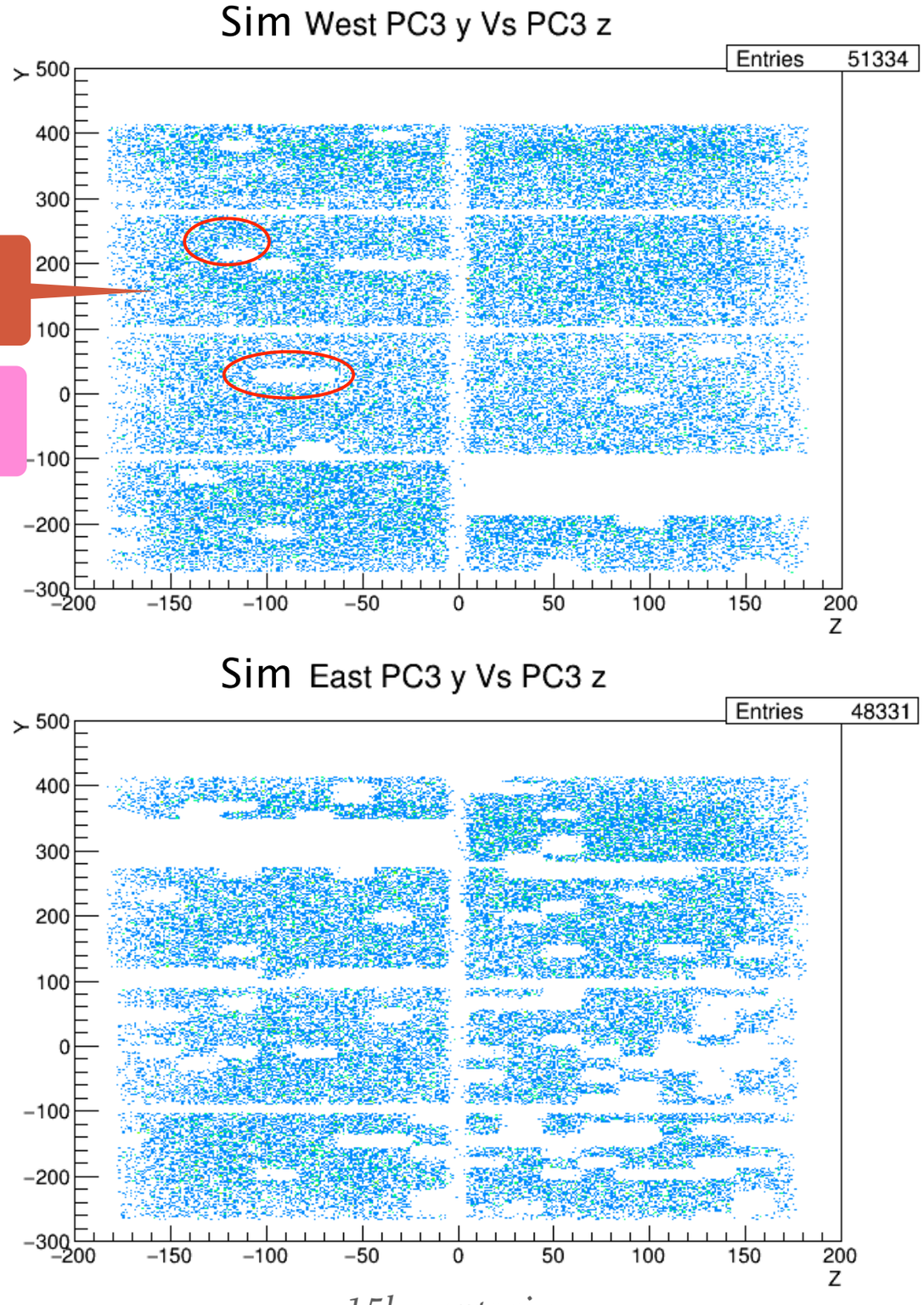
- After the adjustments, plots match reasonably well.



3M events on-disk

Now more consistent!

Now more consistent!



15k events sim

Merge across runnumbers

Total number of bad ROCs

packet_id	grow	gcol	err_id
[4001,4096]	[0,4]	[0,8]	-1,0,1,2
Location			*Flag*

pad_deadroc.dat

4			
4001	2	5	222
4012	0	5	222
4068	1	7	222
4067	0	5	222

+

5			
4001	2	5	222
4012	0	4	222
4066	4	2	222
4065	2	2	222
4067	0	5	222

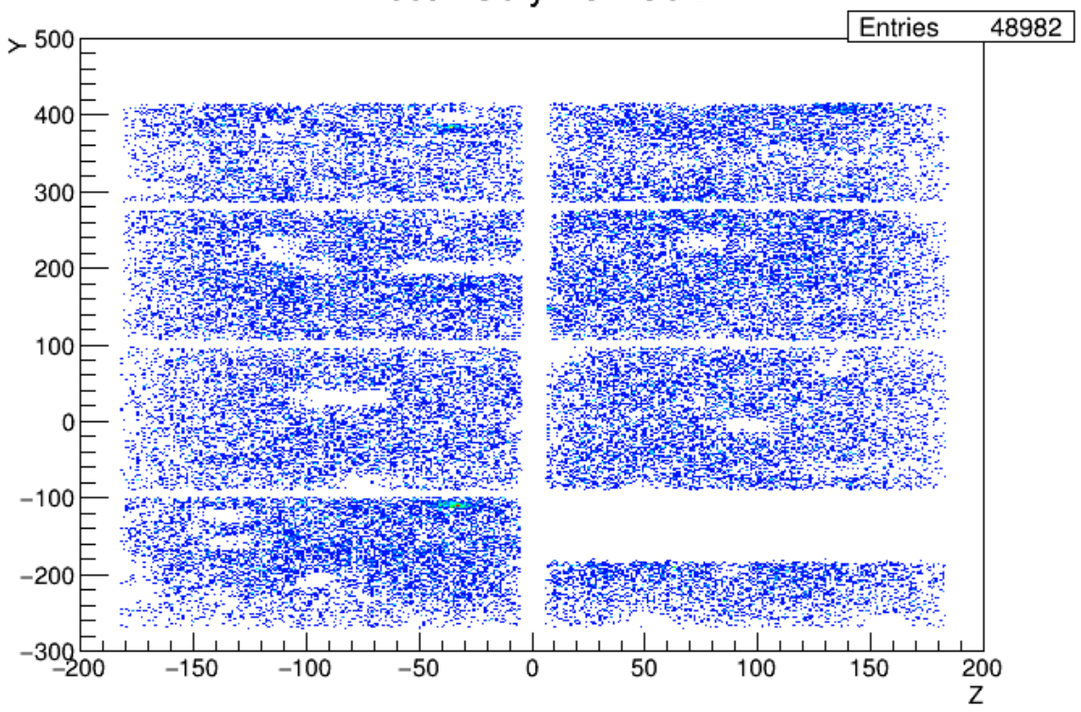
→

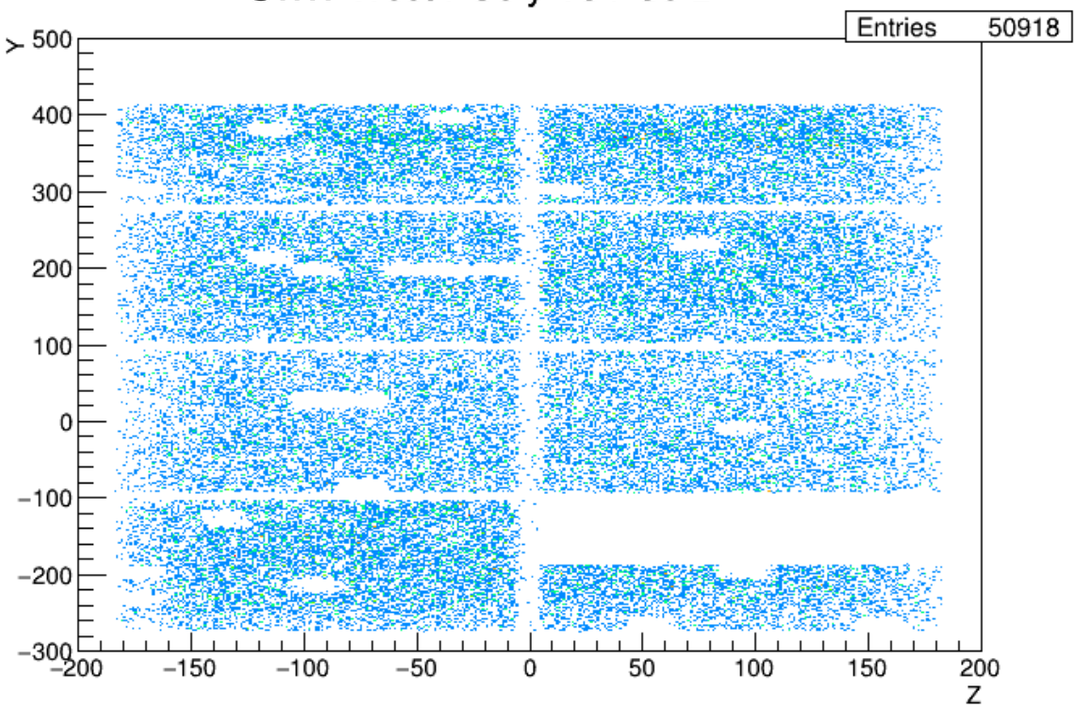
7			
4001	2	5	222
4012	0	4	222
4012	0	5	222
4066	4	2	222
4065	2	2	222
4068	1	7	222
4067	0	5	222

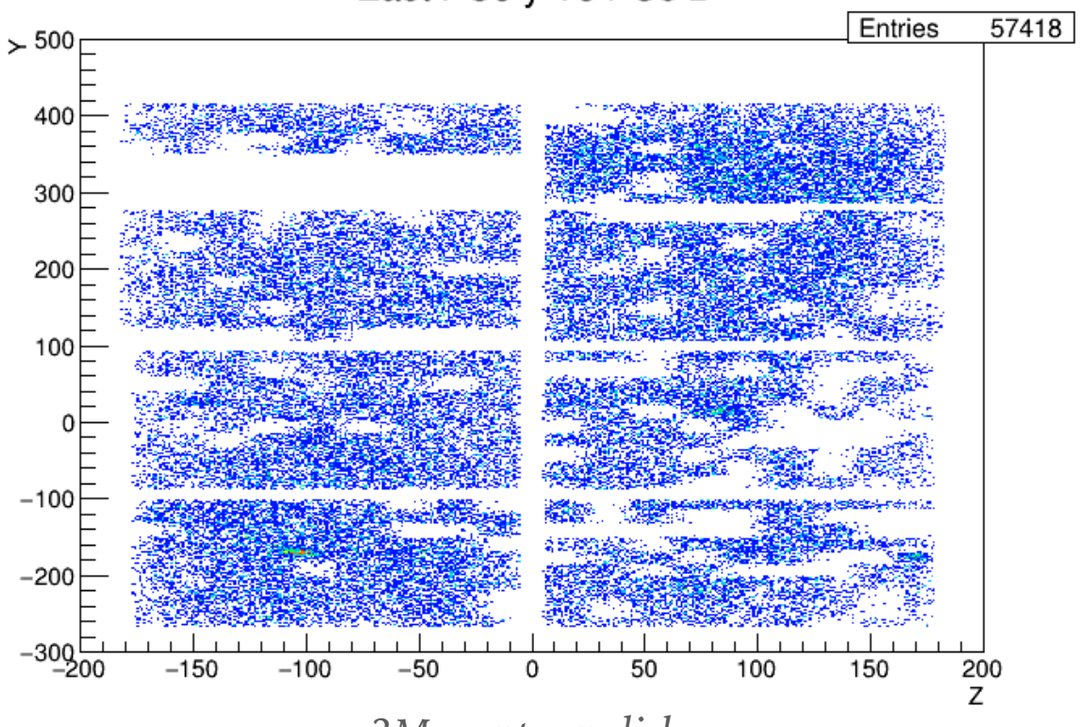
- So far, data vs sim means: data=the runnumber on disk
- For a master file for the whole run year
  - Generated dead roc files from different stages: Early run, middle run, late run, runnumber on disk (getBadRoc.C)
  - "Fix"ed the files accordingly (flipROC.C)
  - Included dead ROCs in pisaToDST.C if appear in any of them

Run13pp510 PC3 Dead Areas

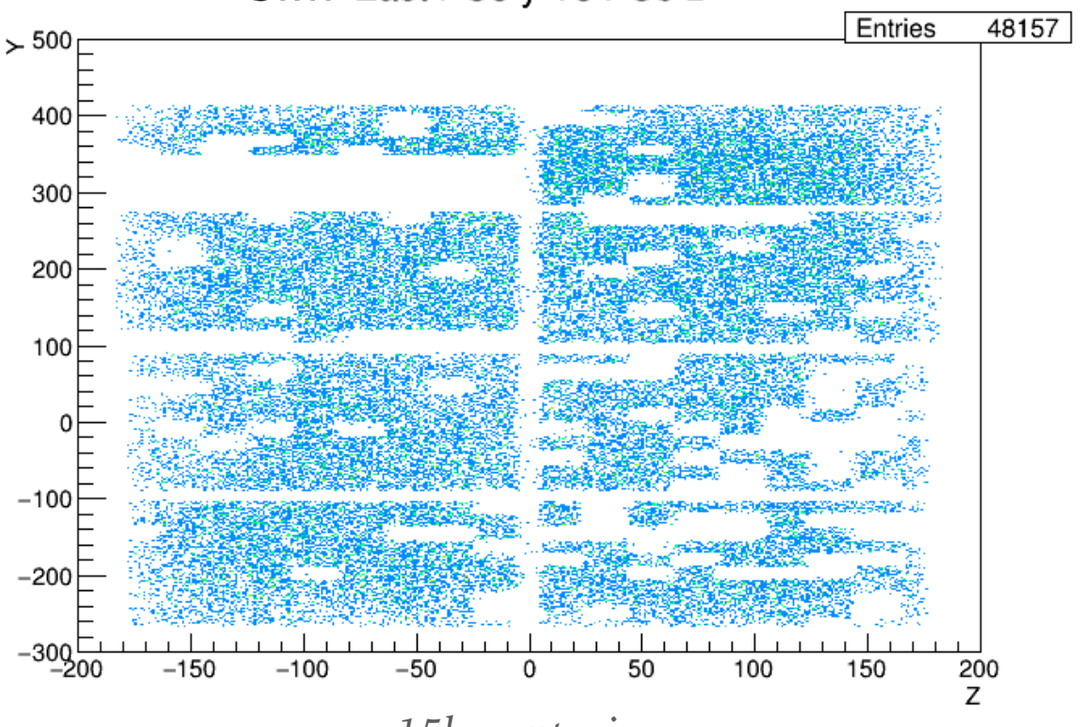
- After merging across some runnumbers for Run13pp510







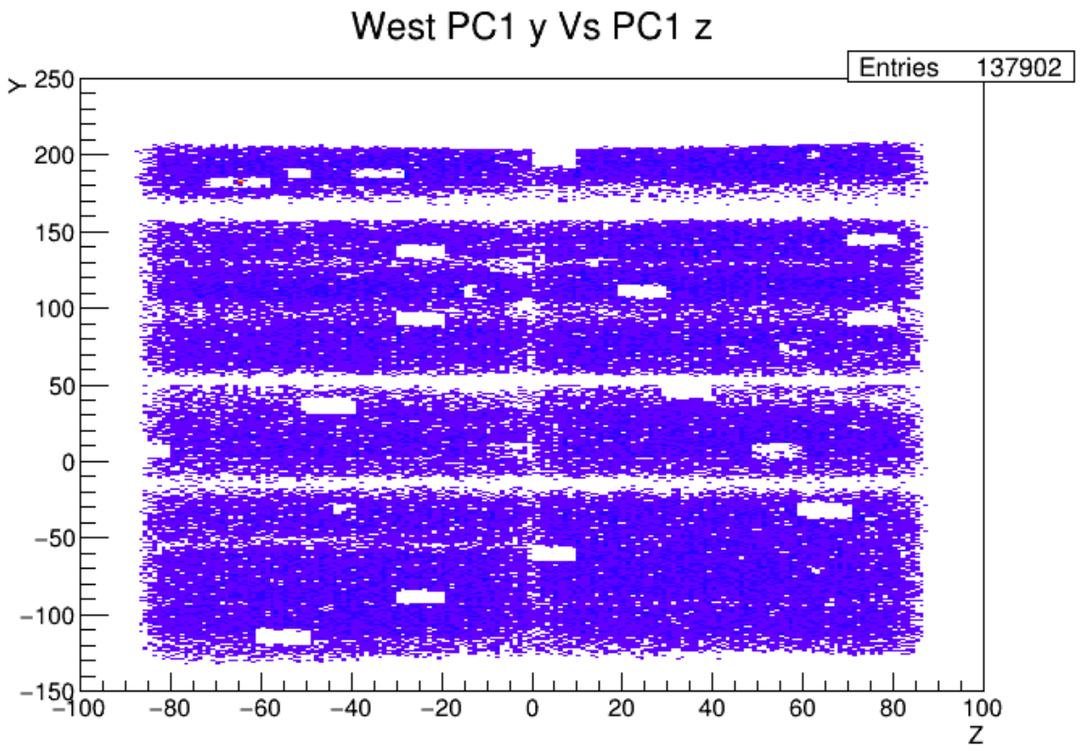
3M events on-disk

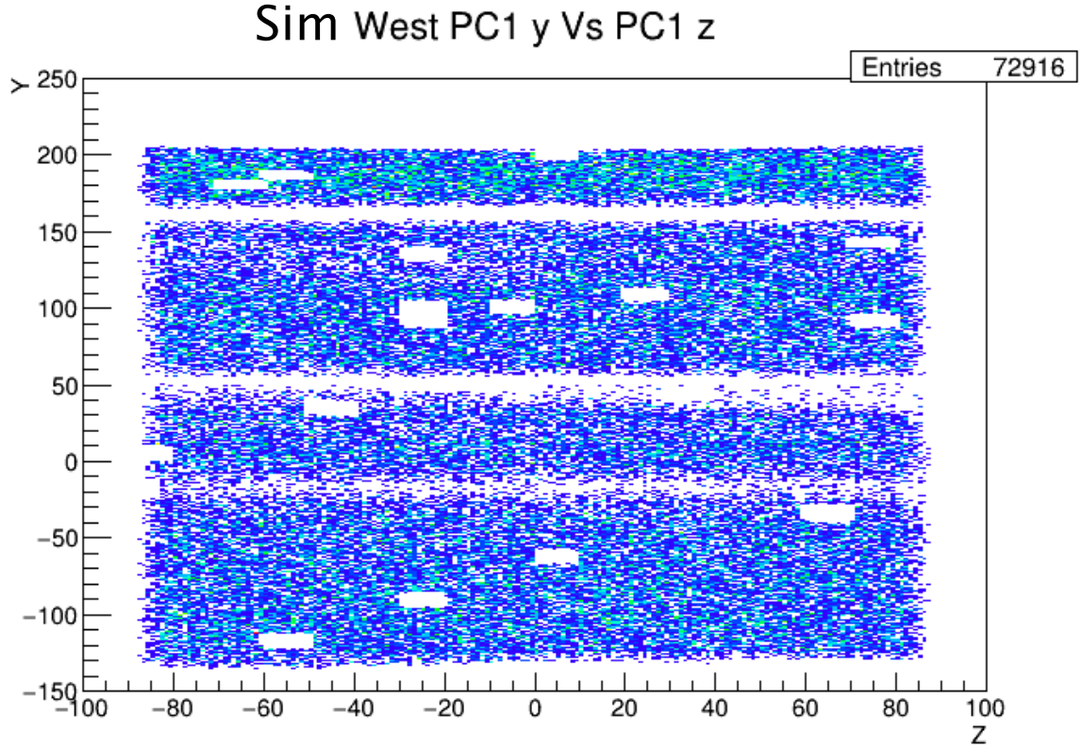


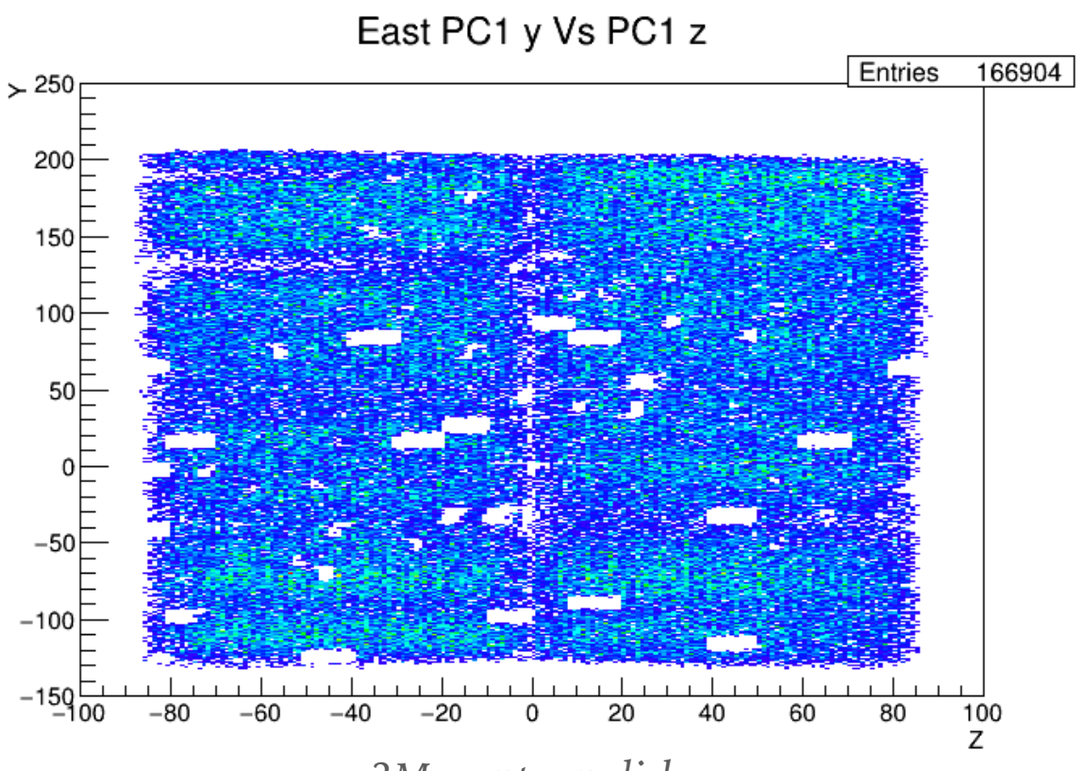
15k events sim

Run13pp510 PC1 Dead Areas

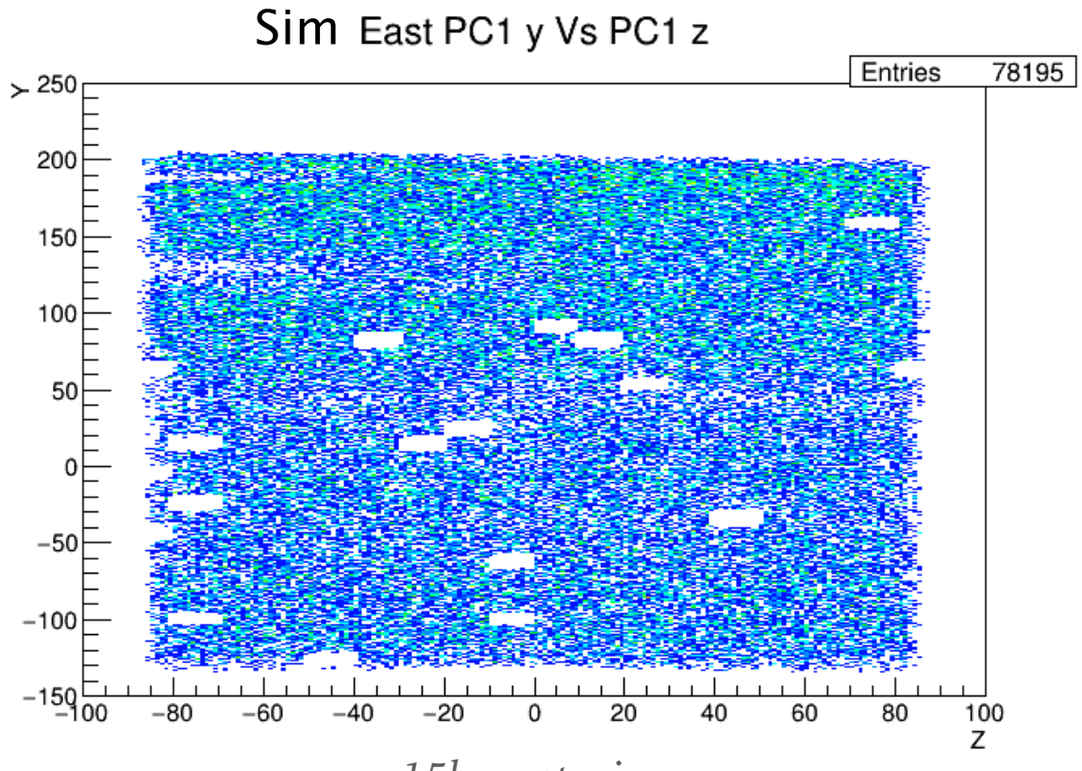
- Also checked with PC1, same problem, same adjustment.







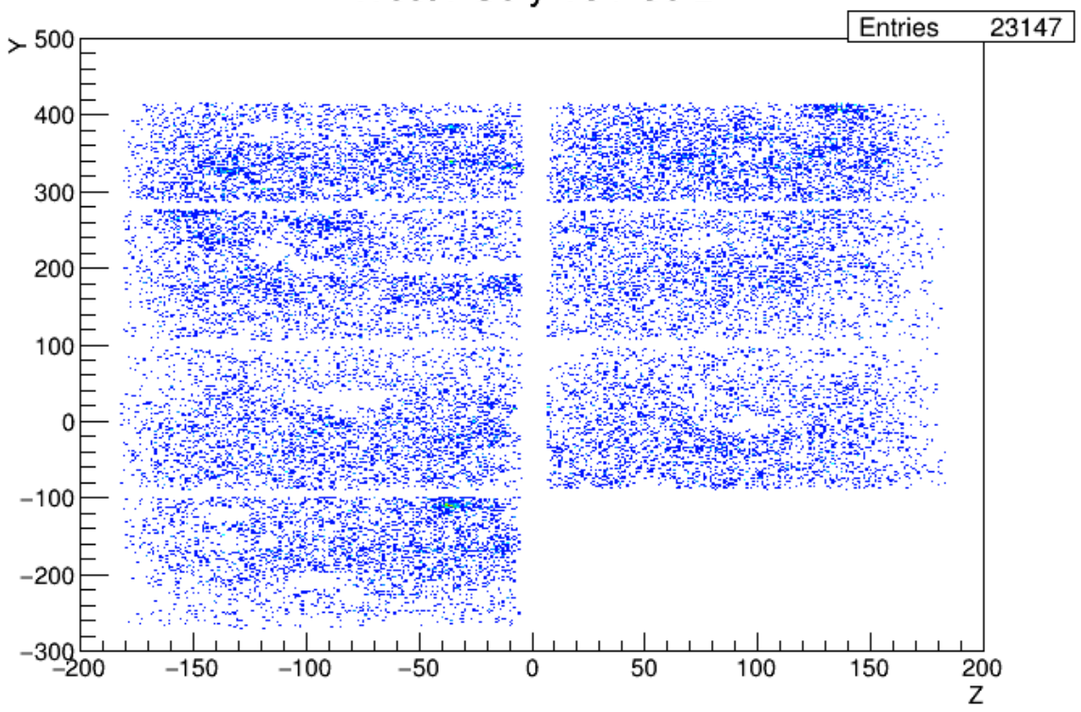
3M events on-disk

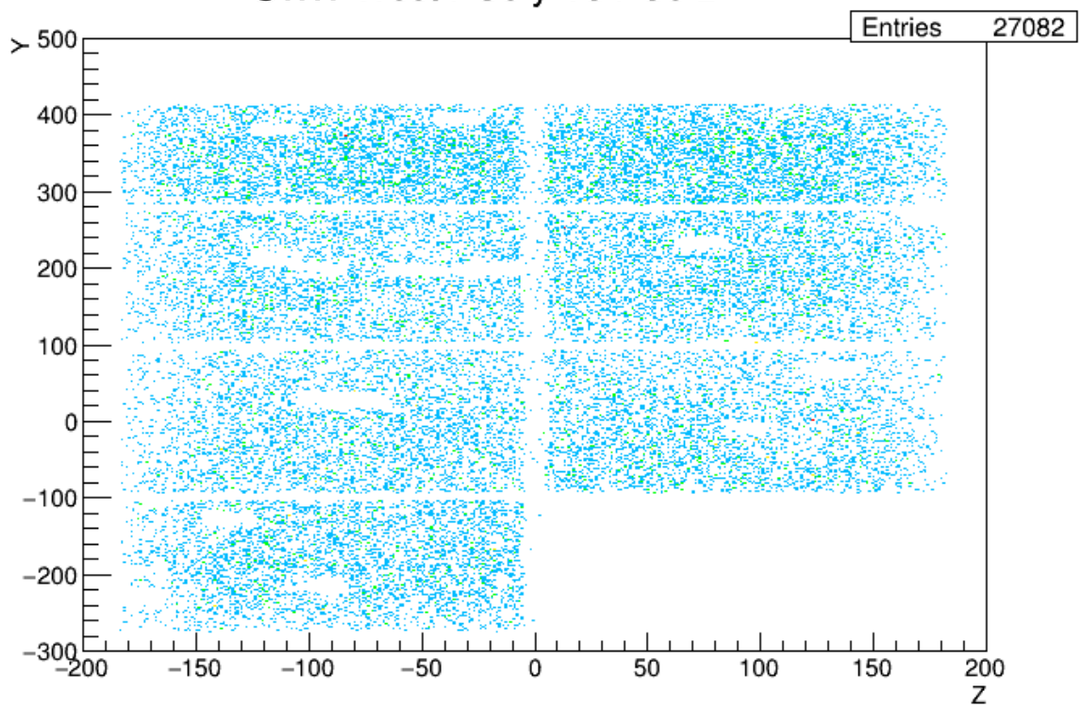


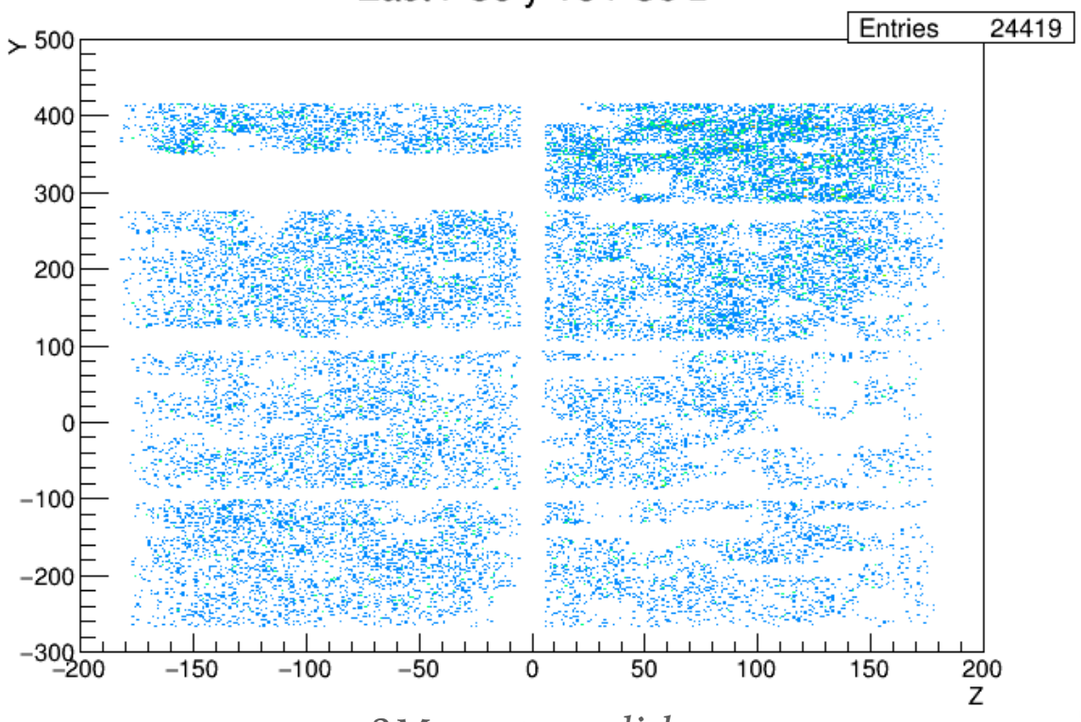
15k events sim

Run12pp200 PC3 Dead Areas

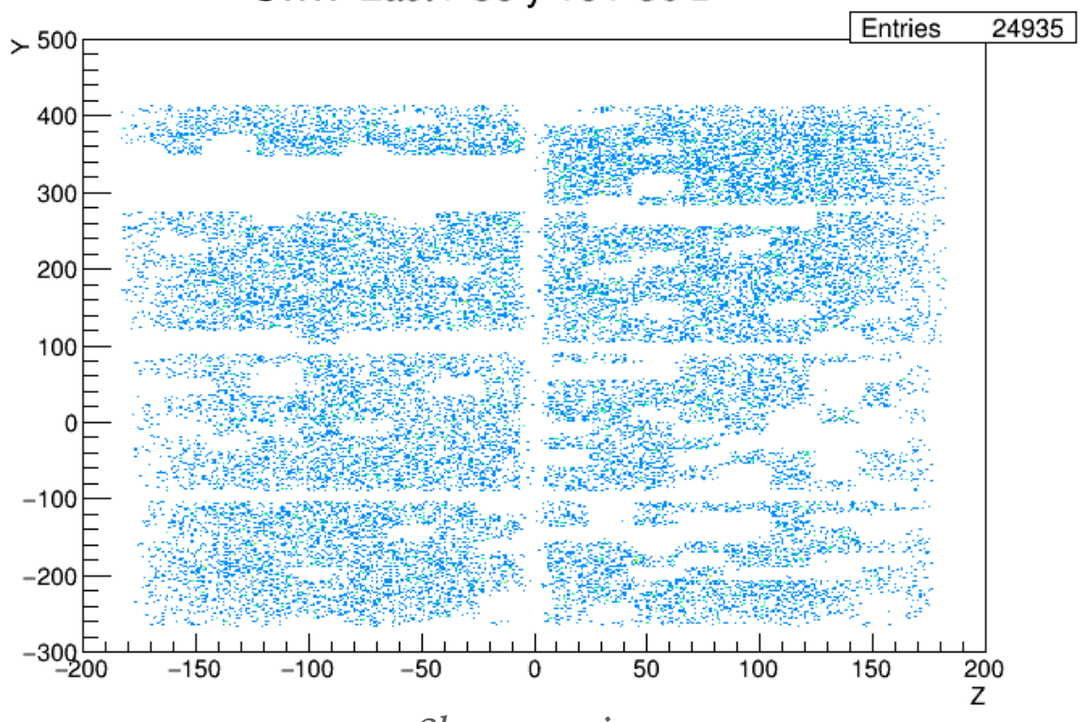
- Checked with Run12, same problem, same adjustment







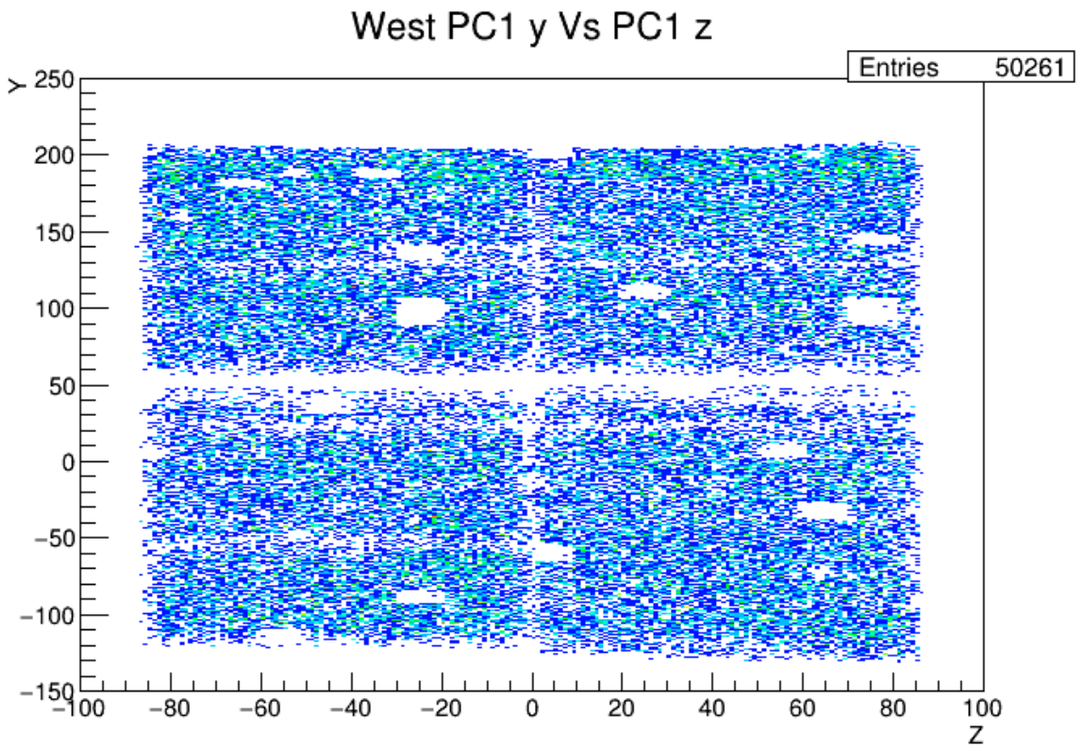
3M events on-disk

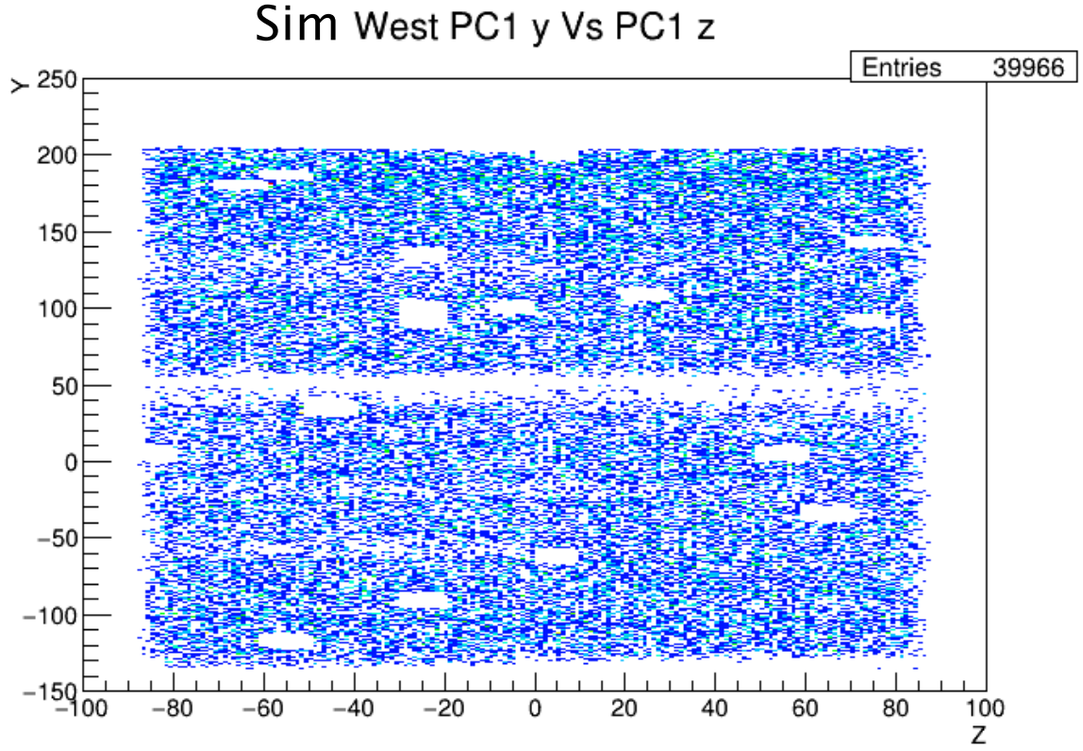


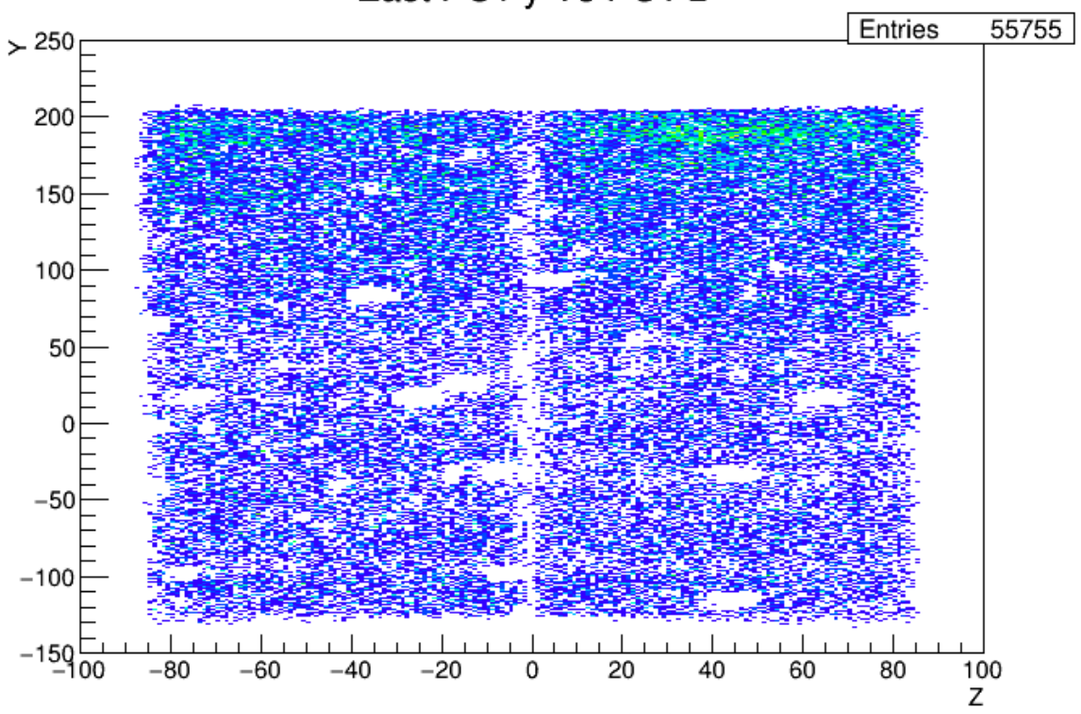
6k events sim

Run12pp200 PC1 Dead Areas

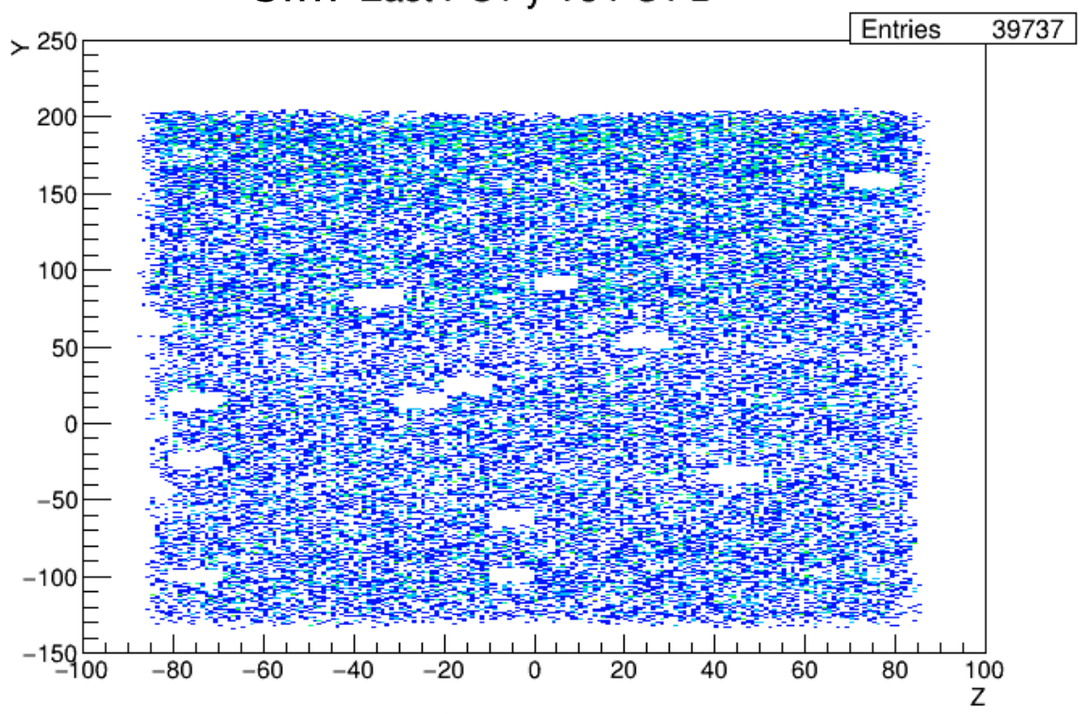
- Same problem, same adjustment.







3M events on-disk



6k events sim

Data plots vs Sim plots

Problem

- Default PC dead area setup gave inconsistent result

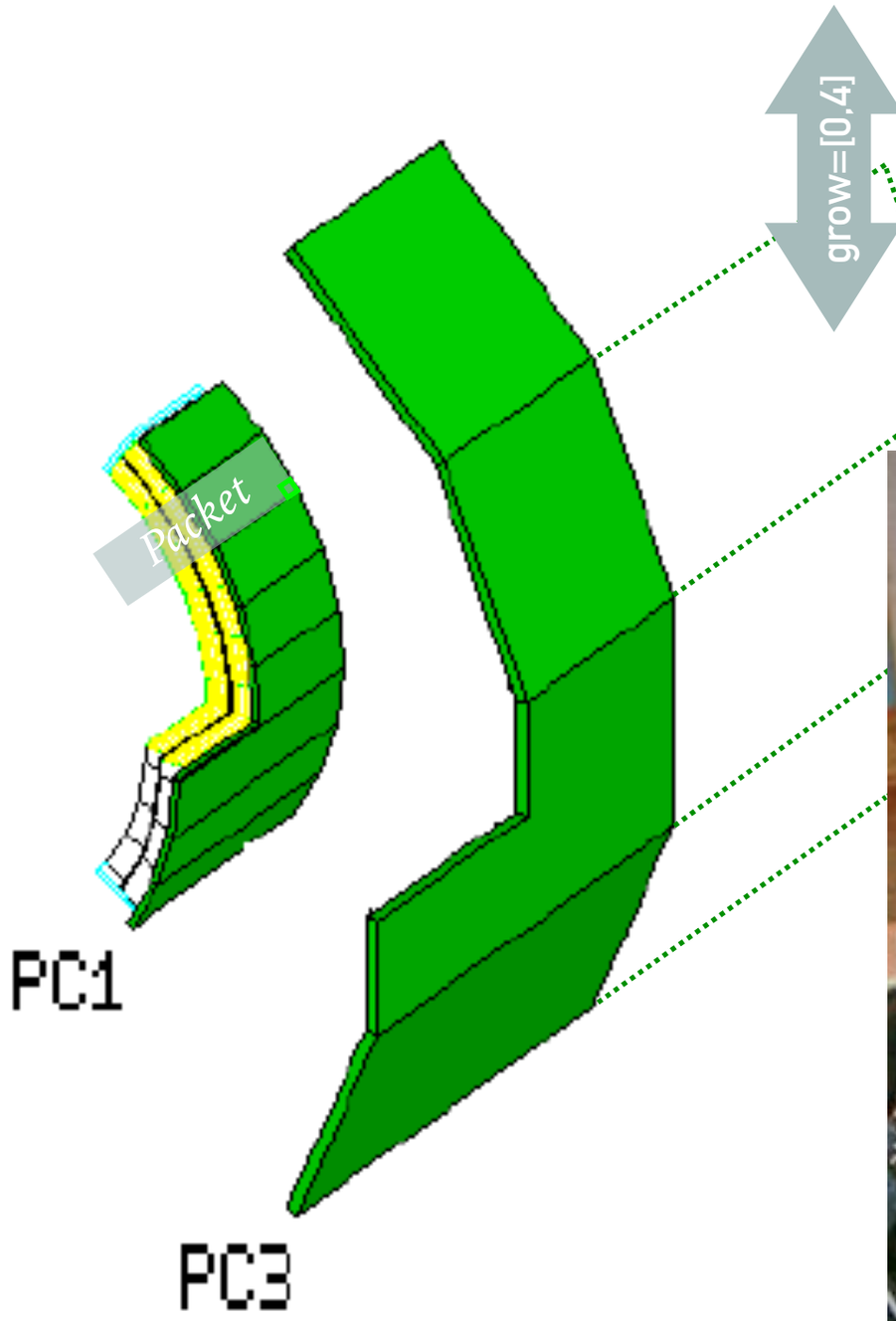
Procedures

- Obtained deadroc.dat files across the run year from database
- “Fix”ed the locations and flags of dead ROCs in the files
- Merged the files across the run year
- Implemented in pisaToDST.C

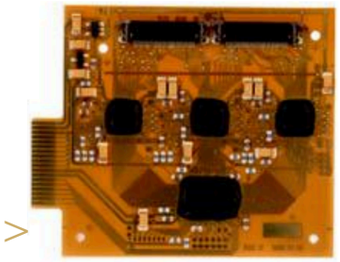
Result

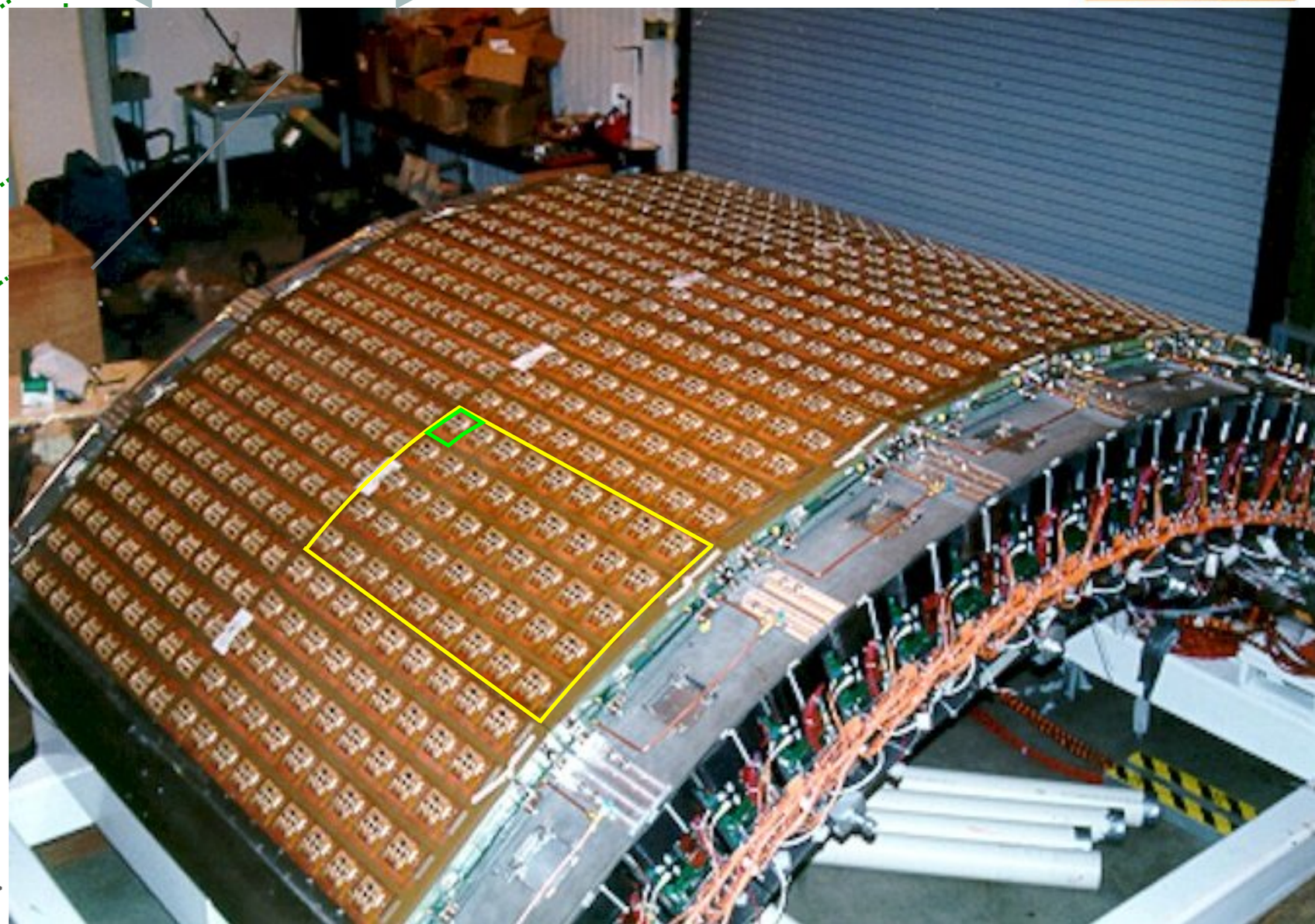
- Plots now show better consistency between data vs sim

Pad Chamber ROC Maps



A ROC ->

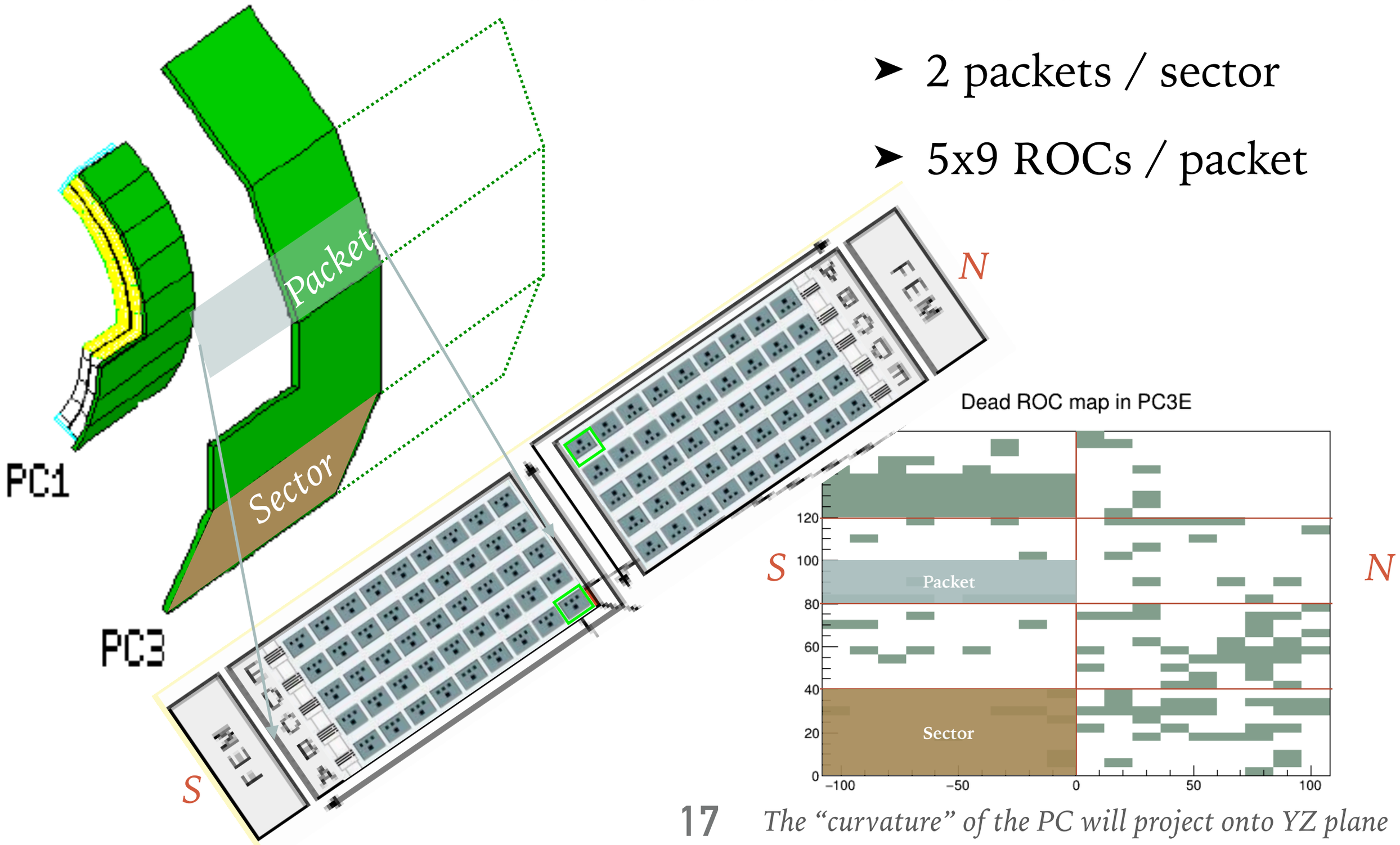




PC1 here ->

Pad Chamber ROC Maps

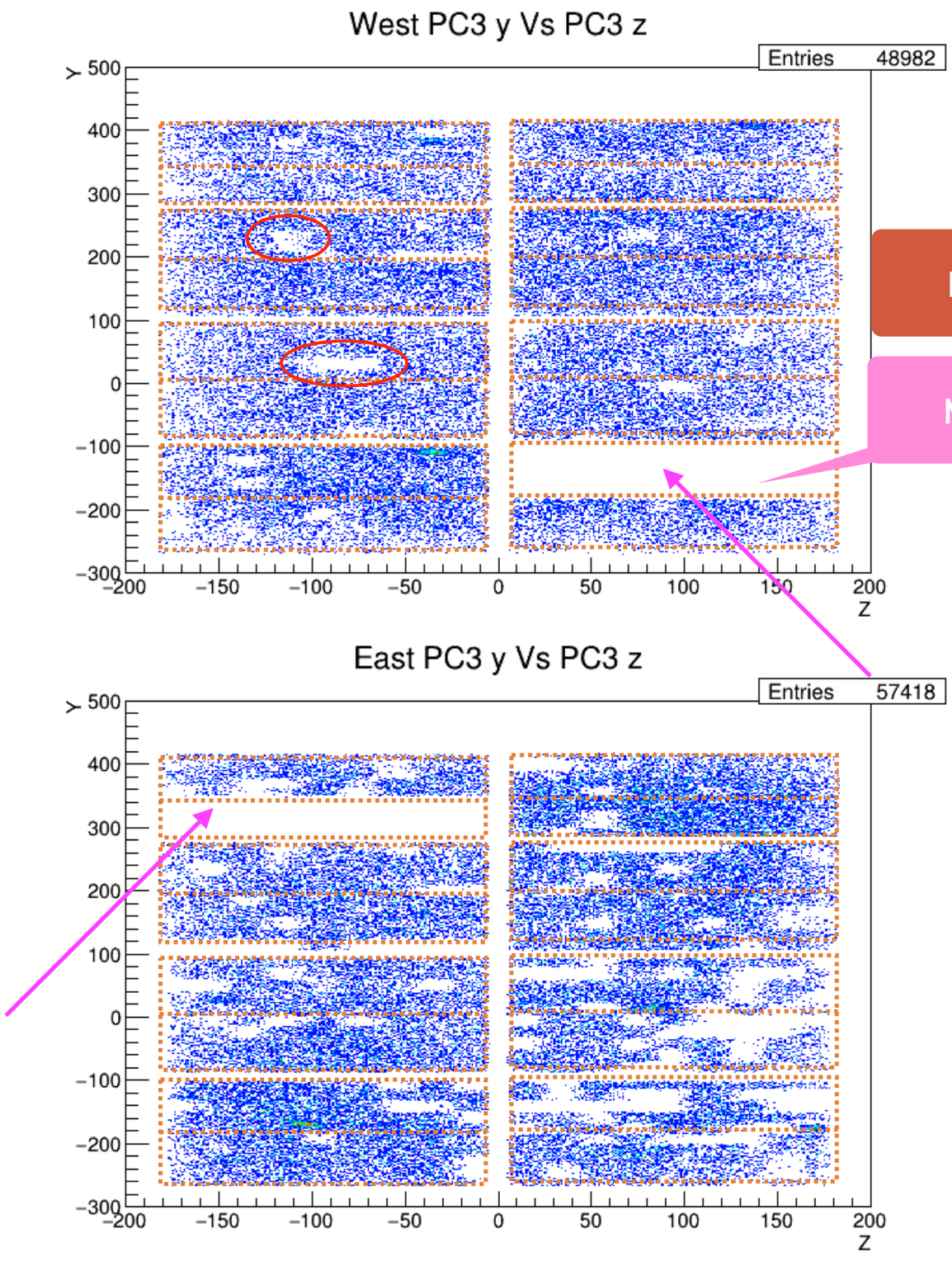
- Map deadroc.dat from database according to installation documentation
  - 2 packets / sector
  - 5x9 ROCs / packet



The "curvature" of the PC will project onto YZ plane

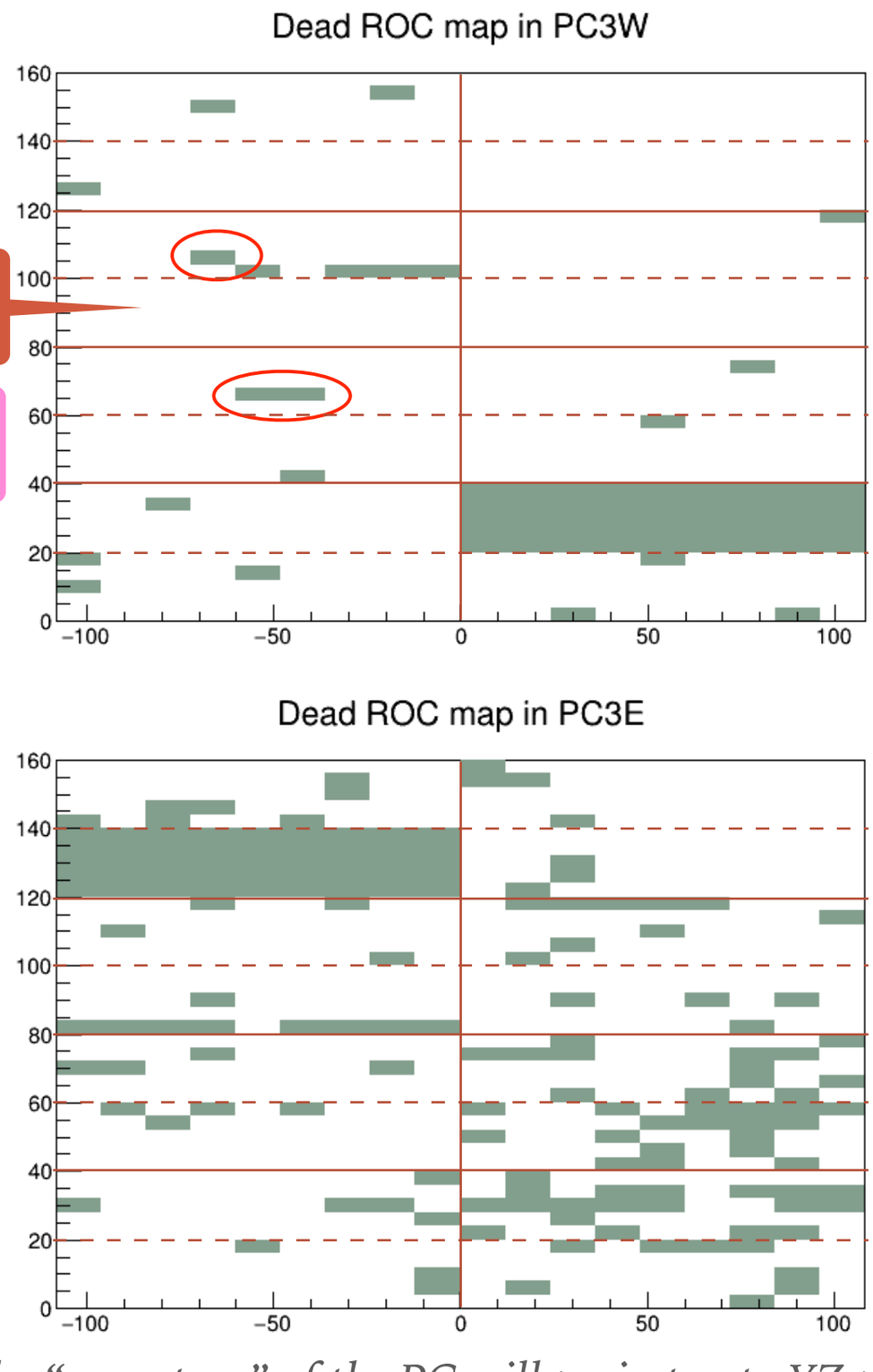
Run13 PC3 Data Plots vs Maps

- Set all err_id=222, then map according to documentations



Match

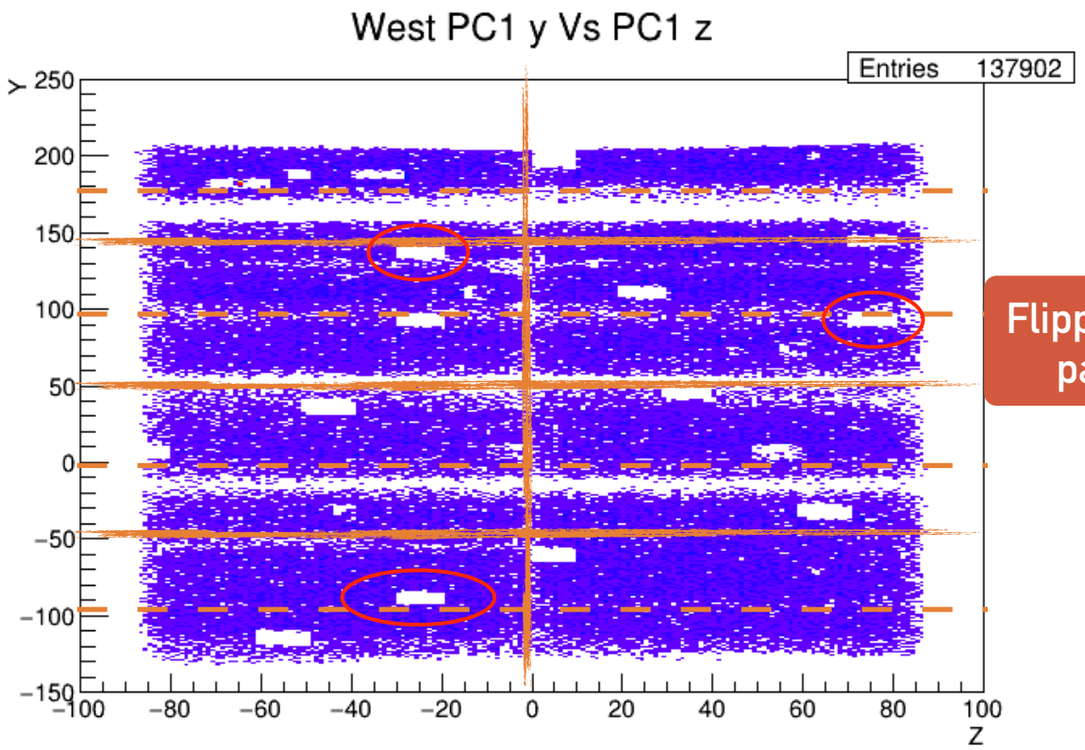
Match

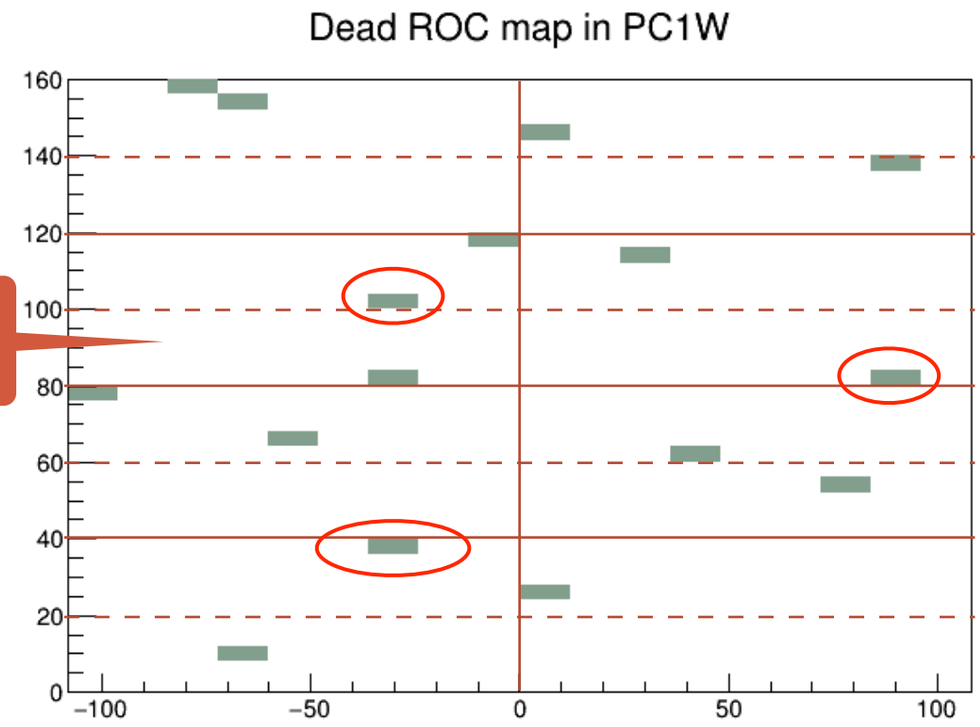


The "curvature" of the PC will project onto YZ plane

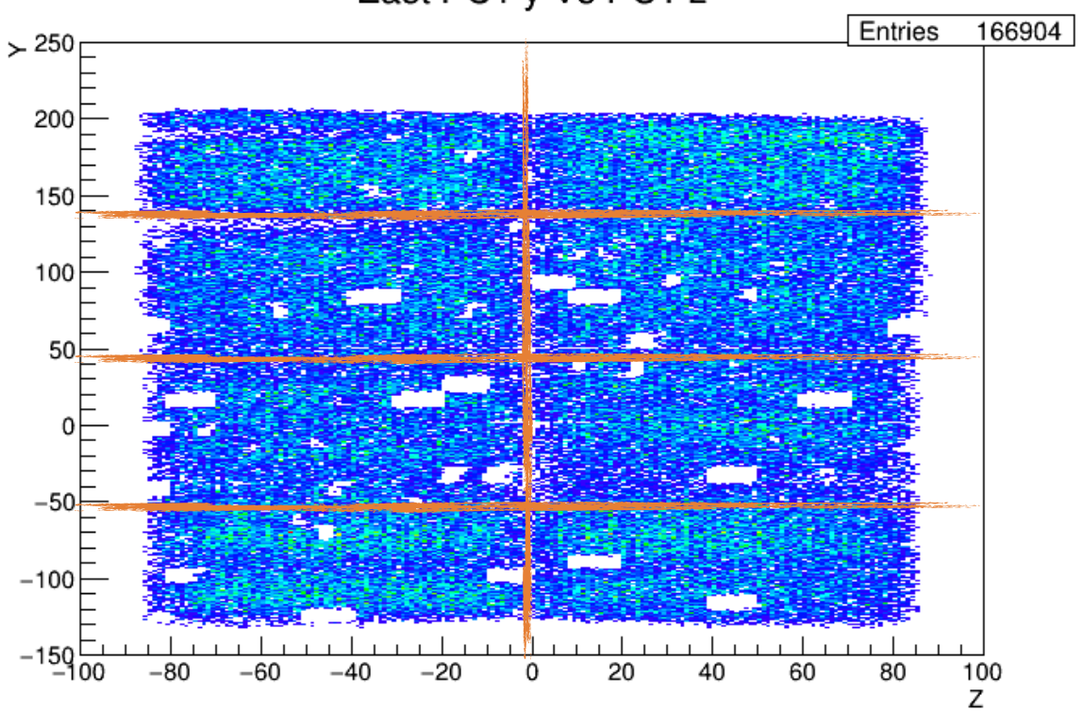
Run13 PC1 Data Plots vs Maps

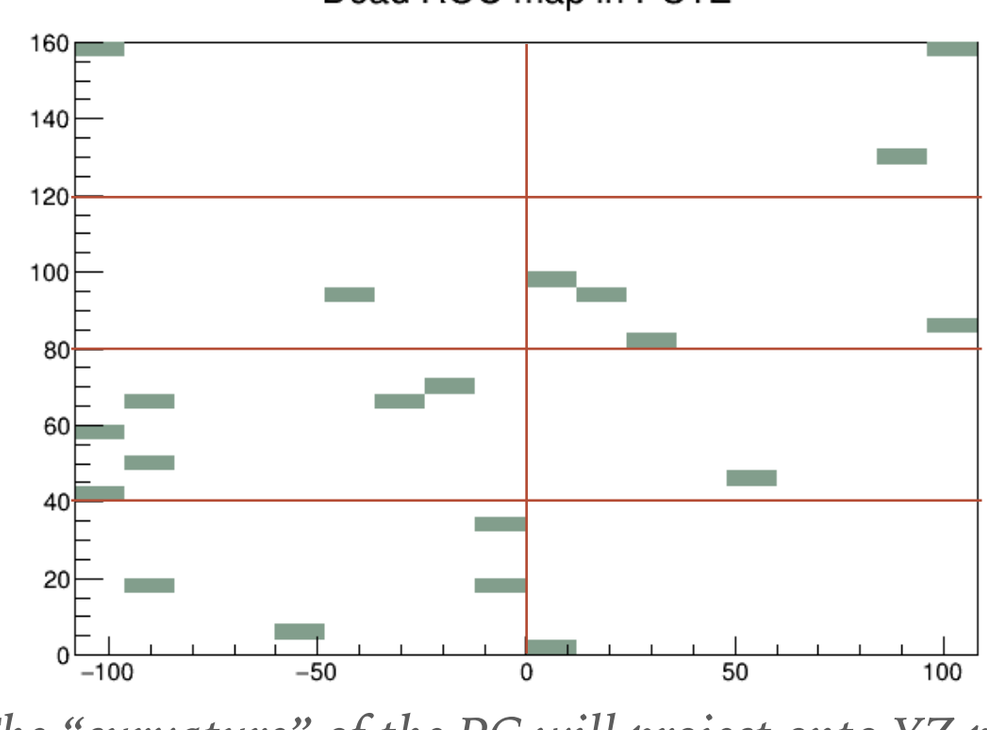
- Set all err_id=222, then map according to documentations





Flipped within packets.





The "curvature" of the PC will project onto YZ plane

Default PC Setup from Database

- Error_id
  - According to documentation: -1,1,2=bad; 0=OK
  - In pisaToDST, needs 222 to kill the whole ROC area
- Location of ROCs (after setting err_ids=222)
  - Plots=PC Y vs Z plots from simDST
    - Maps=PC mapping based on installation documentation
      - PC3W: Plot=👎 Map=👍 (Plot: flips within sectors)
      - PC1W: Plot=👍 Map=👎 (Map: flips within packets)
      - PC3E&PC1E: all good👍
- Question: Which stage(s) did the mismatch occur?

Discussions 🤓

Flag: Error_id

- Option 1: Shift all to 222 in database
- Option 2: Let pisaToDST kill the ROC for any err_id
- Option 3: Include the “fix”ed .dat file for all analyses

Location of ROCs

- Question 1: Which stage(s) went wrong?
- Question 2: Should we :
  - Fix documentation?
  - Fix pisaToDST?
  - Include “fix”ed .dat file for all analyses?

References and Resources

- References
  - Offline Wiki (might needs edit? Last updated July 2010)
  - Codes from /draft/chiu/pad (Last updated July 2010)
  - Paper on phenix tracking detectors (Published Sep 2003)
  - PC Digest site (No longer maintained since Dec 2001)
    - Database information (Last updated Jan 2001)
    - Nomenclature (Last updated Feb 2000)
    - Installation documentation (Last updated Nov 2003)
- For all other codes, visit my draft area. (Active 2019)

All underlined texts are linked throughout slides